









MÉMOIRES
ET
COMPTES RENDUS
DE LA
SOCIÉTÉ ROYALE
DU
CANADA

SECONDE SÉRIE—TOME XII

SÉANCE DE MAI 1906

EN VENTE CHEZ
JAS. HOPE ET FILS, OTTAWA; LA CIE COPP-CLARK (LIMITÉE), TORONTO
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1906

PROCEEDINGS
AND
TRANSACTIONS

OF THE
ROYAL SOCIETY
OF
CANADA

SECOND SERIES—VOLUME XII
MEETING OF MAY, 1906

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 TAYLOR, REV. G. W., *Nanaimo, B.C.*
 WHITEAVES, J. F., LL.D., F.G.S., Geological Survey, *Ottawa*.
 WRIGHT, R. RAMSAY, M.A., B.Sc., University of Toronto, *Toronto*.

CORRESPONDING MEMBERS.

HIS GRACE THE DUKE OF ARGYLL, K.T., G.C.M.G., &c.

- BERTHELOT, MARCELIN, Sénateur, Secrétaire Perpétuel de l'Académie des Sciences, Professeur au Collège de France, *Paris, France*.
 BONNEY, T. G., D.Sc., LL.D., F.R.S., *London, England*.
 BRYCE, RT. HON. JAMES, M.P., D.C.L., *London, England*.
 CLARETIE, JULES, de l'Académie française, *Paris, France*.
 GANONG, DR. W. F., *Northampton, Mass.*
 HECTOR, SIR JAMES, K.C.M.G., F.R.S., *Wellington, New Zealand*.
 HIGGINSON, THOMAS WENTWORTH, LL.D. (Harvard), *Cambridge, Mass.*
 METZLER, W. H., Ph.D., F.R.S. Edin., Mathematical Professor, Syracuse University, *Syracuse, N. Y.*
 OSBORN, DR. HENRY FAIRFIELD, *New York, N.Y.*
 PARKER, SIR GILBERT, Kt., M.P., D.C.L., *London, England*.
 SCUDDER, DR. S. H., *Cambridge, Mass., U.S.A.*

RETIRED MEMBERS.

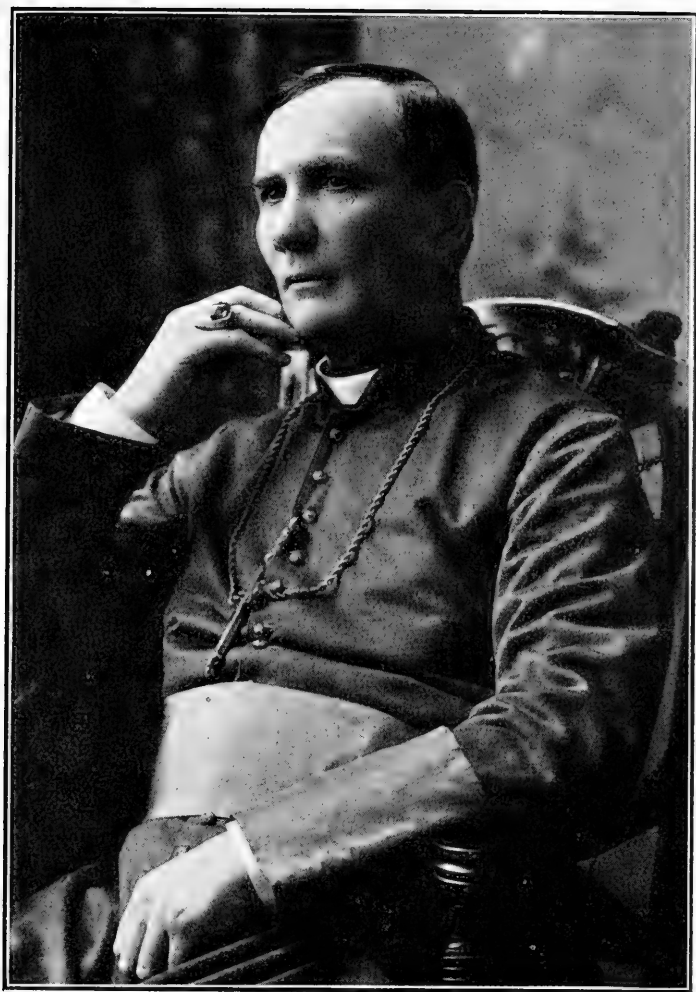
- BOURASSA, NAPOLEON, *St. Hyacinthe, P.Q.*
 CALENDAR, HUGH L., M.A. (Cantab.), F.R.S., *London, Eng.*
 CHERRIMAN, J. B., M.A., *Ryde, Isle of Wight*.
 FABRE, HECTOR, C.M.G., officier de la légion d'honneur, *Paris, France*.
 FRÉCHETTE, LOUIS, C.M.G., docteur en droit, docteur ès lettres, chevalier de la légion d'honneur de France, *Montréal* (ancien président).
 HAANEL, E., Ph.D., Superintendent of Mines, *Ottawa*.
 KIRBY, W., *Niagara, Ont.*
 MACGREGOR, J. G., M.A., D.Sc., F.R.S., F.R.S.E., *Edinburgh, Scotland*.
 MAIR, CHARLES, *Prince Albert, N.W.T.*
 OSLER, W., M.D., *Oxford, Eng.*
 ROBERTS, C. G. D., M.A., *New York*.

LIST OF PRESIDENTS.

1882-'83	.	.	.	.	.	.	SIR J. W. DAWSON, Kt.
1883-'84	.	.	.	.	.	.	L'HONORABLE P. J. O. CHAUVEAU.
1884-'85	.	.	.	.	.	.	DR. T. STERRY HUNT.
1885-'86	.	.	.	.	.	.	SIR DANIEL WILSON, Kt.
1886-'87	.	.	.	.	.	.	MONSIGNOR HAMEL.
1887-'88	.	.	.	.	.	.	DR. G. LAWSON.
1888-'89	.	.	.	.	.	.	SIR SANDFORD FLEMING, K.C.M.G.
1889-'90	.	.	.	.	.	.	L'ABBÉ CASGRAIN.
1890-'91	.	.	.	.	.	.	VERY REV. PRINCIPAL GRANT.
1891-'92	.	.	.	.	.	.	L'ABBÉ LAFLAMME.
1892-'93	.	.	.	.	.	.	SIR J. G. BOURINOT, K.C.M.G.
1893-'94	.	.	.	.	.	.	DR. G. M. DAWSON, C.M.G.
1894-'95	.	.	.	.	.	.	SIR J. MACPHERSON LEMOINE, Kt.
1895-'96	.	.	.	.	.	.	DR. A. R. C. SELWYN, C.M.G.
1896-'97	.	.	.	.	.	.	MOST REV. ARCHBISHOP O'BRIEN
1897-'98	.	.	.	.	.	.	L'HONORABLE F. G. MARCHAND.
1898-'99	.	.	.	.	.	.	T. C. KEEFER, C.M.G.
1899-1900	-	-	-	-	-	-	REV. PROFESSOR CLARK, D.C.L.
1900-1901	-	-	-	-	-	-	L. FRECHETTE, C.M.G., LL.D.
1901-1902	-	-	-	-	-	-	PRESIDENT LOUDON, LL.D.
1902-1903	-	-	-	-	-	-	SIR JAMES A. GRANT, K.C.M.G. M.D., F.G.S.
1903-1904	-	-	-	-	-	-	LT.-COL. G. T. DENISON, B.C.L.
1904-1905	-	-	-	-	-	-	BENJAMIN SULTE.
1905-1906	-	-	-	-	-	-	DR. ALEX. JOHNSON.
1906-1907	-	-	-	-	-	-	DR. WM. SAUNDERS, C.M.G.



RAPHAEL BELLEMARE, LIT.D.



ARCHBISHOP O'BRIEN.



GEORGE STEWART, LL.D.



C. BAILLARGÉ, C.E.

ROYAL SOCIETY OF CANADA

PROCEEDINGS FOR 1906

TWENTY-FIFTH GENERAL MEETING

SESSION I. (Tuesday, May 22.)

The Royal Society of Canada held its twenty-fifth general meeting in the Normal School Building, Elgin Street, Ottawa.

The President, Dr. Alex. Johnson, took the chair at 10 o'clock a.m., and called the meeting to order. The roll was then called by the Secretary.

PRESENT:

President, Dr. Alex. Johnson.

Vice-President, Dr. Wm. Saunders.

Honorary Secretary, Dr. S. E. Dawson.

Honorary Treasurer, Dr. Jas. Fletcher.

The following members, in their sections, were present at the roll-call, or arrived later during the session:—

SECTION I.—Most Rev. Archbishop Bruchési, Errol Bouchette, Hon. L. O. David, Dr. DeCelles, Léon Gérin, l'Abbé Gosselin, Hon. P. Poirier, Dr. J. E. Roy, B. Sulte.

SECTION II.—W. W. Campbell, Dr. S. E. Dawson, Lt.-Col. Denison, Dr. Doughty, C. C. James, W. D. Lighthall, Dr. Morgan, Geo. Murray, Dr. J. Clark Murray, John Reade, John Willison.

SECTION III.—Prof. Baker, Prof. Barnes, Prof. Cox, Dr. W. Bell Dawson, Dr. Deville, Dr. Ellis, Sir Sandford Fleming, Dr. Girdwood, Dr. Glashan, Dr. Hoffmann, Dr. Johnson, Dr. Keefer, Thos. Macfarlane, Dr. Lash Miller, Prof. McLeod, Prof. Owens, Dr. Rutherford, Frank Shutt.

SECTION IV.—Dr. Adams, Dr. Ami, Dr. Bailey, Dr. Barlow, Rev. Dr. Bethune, Dr. Burgess, Dr. Ells, Dr. Fletcher, Sir James Grant, Dr. Hay, W. H. Harrington, L. M. Lambe, Dr. Macallum, Prof. Macoun, Dr. G. Matthew, Dr. Wesley Mills, Prof. Penhallow, Dr. Poole, Prof. Prince, Dr. Saunders, Rev. G. W. Taylor, Dr. Whiteaves, Prof. Ramsay Wright.

Letters of excuse regretting unavoidable absence were received from,

SECTION I.—Most Rev. Archbishop Bégin, Sir J. M. LeMoine, Mgr. Paquet, l'Abbé Roy.

SECTION II.—Rev. Dr. Bryce, Rev. Dr. Burwash, Rev. Dr. Clark, Rev. C. W. Gordon, Hon. Judge Longley, Dr. LeSueur, Dr. Parkin, Hon. Dr. Ross, D. C. Scott.

SECTION III.—Dr. Bovey, Prof. Dupuis, Dr. Goodwin, Dr. Harrington, President Loudon, Dr. McLennan, R. F. Stupart.

SECTION IV.—Dr. Bell, Prof. Fowler, E. Gilpin, Abbé Laflamme, Dr. A. H. MacKay, Prof. Coleman.

The Most Rev. Archbishop Bruchési and Mr. Errol Bouchette being newly elected Fellows, were presented to the President and took their seats.

The Honorary Secretary then read the following

REPORT OF COUNCIL, 1906.

The Council of the Royal Society of Canada have the honour to present their annual report, as follows:—

1.—PRINTING OF TRANSACTIONS.

The “Proceedings and Transactions” for 1905 have been published, and make a volume of 866 pages, containing 14 maps and illustrations. Thirty-one papers have been printed, and 5,050 copies of separates have been distributed to Fellows of the Society. The volume is smaller than usual, for several important papers were too late to be included. The volume for this year promises to be unusually large. An important paper by Dr. Ganong, to close up his series of monographs upon the history and geography of New Brunswick, intended for this volume, could not be got ready in time, and will appear in the next. The thoroughness with which Dr. Ganong has elucidated the history of his native province should instigate similar labours on behalf of the other provinces.

The volume for this session will be the twelfth of the second or octavo series, and will mark an epoch in the history of the Society. Whether the second series be continued or a new and third series be commenced is a subject for consideration at next session. Our late president, Mr. Sulte, is preparing a fitting close in the shape of a complete index, by name and subject, of the whole twenty-four volumes from the first. It is a work of very great labour and, it is scarcely necessary to add, of equally great utility. The extent and value of the information locked up in these two series cannot be properly appreciated until it is made readily accessible by such an index. The index will be more useful if published as a separate volume—the twenty-fifth of the whole series. Dr. Dionne will also crown his labours by a bibliography of works in the English language published in Canada

from the Conquest to the present time. His bibliography of French works has been much inquired for, and librarians of the great libraries have recognized its merits and utility.

2.—ACCOUNTS.

The accounts have been audited by experts in the usual manner, and the vouchers have been transferred to the Treasurer. The following is a statement:

To Balance brought forward as per page V of Proceedings
for 1905 \$1,574 49

1905. *Cr.*

June 1.—E. Helliard—services at last meeting....	\$ 8 00
“ —Oliver Macdonald—services at last meeting	10 00
“ 6.—John P. Dunne—use of stereopticon....	10 00
“ —“ Evening Journal ”—advertising	10 50
“ —M. G. Bristow—typewriting.....	3 50
“ —Photographing illustrations	6 00
“ —“ Free Press ”—advertising	8 50
“ —Crown Lithographing Co.	0 75
“ —Express	0 30
June 13.—Gazette Printing Co.	133 72
June 20.—Proofreading	40 00
“ —Clerical services—distribution	20 00
“ —“ The Citizen ”—advertising	10 50
“ —R. J. Taylor—printing	26 50
“ —Mortimer & Co.—binding and despatching	629 79
June 27.—Printing Transactions—on account....	500 00
July 13.—Insurance	17 50
July 5.—Freight on American distribution.....	16 96
July 13.—Gazette Printing Co.	121 97
	—————\$1,574 49

Statement July 1, 1905, to May 22, 1906.

1905. *Dr.*

Sept. 11.—To amount on account of Government Grant....	\$3,000 00
1906.	
May 11.—To amount on account of Government Grant....	2,000 00
	—————\$5,000 00

<i>Brought forward</i>		\$5,000 00
1905.	<i>Cr.</i>	
Sept. 26.	Grip Company—illustrations	\$ 51 25
“	—Heliotype Co.—illustrations	112 00
“	—American Express	2 30
“	—Engrossing (R. P. King).....	3 75
“	—Typewriting (M. G. Bristow).....	3 75
“	—Mortimer & Co.	34 25
“	—Expenses on European distribution.....	128 26
“	—Express	34 85
Oct. 4.	Copying (Bristow)	4 05
Dec. 18.	Printing Transactions, on account.....	1,000 00
1906.		
Jan. 8.	Crown Lithographing Co.....	1 25
“	—Freight and Insurance to London.....	21 11
“	—Express charges	6 15
Mch. 21.	Printing Transactions, on account.....	1,000 00
“	—Proofreading — French.....	40 00
“	—Mortimer & Co.—Binding.....	144 15
“	—Express	9 88
“	—Orme & Co.—use of piano.....	3 00
“	—John Robertson—storage	48 00
“	—J. K. O’Connell—Copying diagrams....	10 00
April 5.	Insurance	78 75
May 9.	Grip Engraving Co.....	104 85
“	—M. G. Bristow—typewriting.....	2 80
“	—Crown Lithographing Co.	6 25
“	—Telegraph Co.	0 95
May 10.	American Express Co.	2 92
		<hr/> 2,854 52
Balance on hand.....		<hr/> \$2,145 48

3.—INACTIVE MEMBERS.

The Council would call attention to the necessity of keeping the activity of its membership up to the standard set by its founders. The objects of the Society are plainly set forth in the statute of organization (46 Vic., cap. 46), as well as in the first of its Regulations. It is a society for work in literature and science and its founders, by regular attendance and by contributions to the Transactions manifested a living interest in the promotion of science and letters in the Dominion of which they were citizens. The membership is limited, and no provision has been made in the statute of organization for

merely honorary members. Sixteen corresponding members, four for each section are provided for. The Transactions, as set forth in the statute, are intended for original papers and memoirs of merit. They are a medium for the publication of papers of permanent value such as find no place in popular periodical literature. The volumes are sent to every important library throughout the world, and from the letters received by the Secretary it is evident that they are highly esteemed. Applications are incessant for separates of special articles, and if a sheet happens to be missing in any volume, the Secretary hears of it at once, whether from Chicago or Sydney, Australia. One entire paper has been taken as a chapter for an historical work of importance now being published in the United States. The name of the author is given and though the Society is not mentioned and permission was not asked, this shows that the papers in the Transactions are not neglected, but referred to and used in foreign countries. To build up a memorial to science and letters in this country of our own is a patriotic duty which has been set for us to do, and only by unselfish labour can it be done. The fact that there is a statute of the Dominion to organize this Society is probably unknown to the later Fellows and the chapter is reprinted in this year's Transactions. (*Vide* Appendix B.)

4.—DECEASED MEMBERS.

The ranks of the Society were unbroken when the accustomed time for sending out nominations arrived, and it seemed as if the whole year would pass without a break, but within a very short period four of our members were called away, one in Section I., two in Section II., and one in Section III.

Raphael Bellemare was born at Yamachiche, February 22nd, 1821. He was educated at Nicolet College, and was professor of *belles-lettres* in that institution from 1847 to 1855, during which period he also was a regular contributor to *La Minerve* of Montreal. Soon after he was called to the bar, and later was appointed revenue inspector, a position which he held until July, 1893, when he retired. He was one of the founders and one of the most devoted members of *La Société Historique de Montréal* and wrote a number of historical studies upon the early days of Canada, and especially a book containing the annals of Yamachiche. He was for forty years president of the St. Vincent de Paul Society of Montreal. He was also a director of the Montreal City and District Savings Bank, of which he was for several years vice-president. He was also a director of the General

Colonization and Repatriation Society of the province of Quebec. He was very methodical, sympathetic and hard working and his useful labours were continued until the last day of his life.

The death of Archbishop O'Brien (March 9th, 1906) deprived our Society of one of its most effective members. The position of president, which he filled in 1896-7, testifies to the respect in which he was held by the members and to the value which was placed on his services.

He was born on May 4th, 1843, in Prince Edward Island, and his early education was obtained in the schools of the island. Later, he was trained for two years at St. Dunstan's College at Charlottetown. Attracting the attention of Bishop McIntyre, he was sent to Rome to fill a vacant place in the College of the Propaganda, in 1864, at the age of twenty. Seven years were spent in the training afforded by that unique institution, where are to be found men of all the tongues of the world. In 1871 he graduated, and was ordained priest, having carried off the gold medal of the college for general proficiency. From 1871 to 1873 he filled the post of professor and prefect of studies at St. Dunstan's College. In 1873 he was appointed principal priest at the Cathedral of Charlottetown. His health here failed; and for the eight succeeding years he was parish priest at Indian River, bringing to the daily duties of a simple parish priest the scholarship and experience received at Rome. In 1880 he was invited by the late Archbishop Hannan, of Halifax, to accompany him to Rome. The Archbishop was then in feeble health and probably had fixed on Dr. O'Brien as his probable successor. He died in 1882, and Dr. O'Brien was duly appointed to succeed him by a Bull dated December 2nd, 1882.

The twenty-four years of his episcopate were full of practical activities, in which he was generously supported by his people. Charitable institutions, religious orders and schools all felt his creative and prudent hand. His pastoral letters were remarkable for scholarly composition and wise exhortation. He was wide-minded in his benevolent activities, and the principal public institutions in Halifax were constantly objects of his care.

Towards public affairs he had a strong patriotic inclination. Disposed by birth and education to sympathize strongly but reasonably with the aspirations of the Irish people, he was even more strongly an advocate of Imperial unity and British interests at home and abroad. In the political affairs of the Dominion he prudently took little part, save on occasions when educational questions imperatively called on him, as he believed, to take action.

His talents for the task of administration, always troublesome and trying, never for a moment dulled his interest in literature. He was essentially a student, and in many directions. Theology, Geography, History, Philosophy and Belles-lettres, each had charms for him and he was proficient in all. His publications are as follows: "Philosophy of the Bible Vindicated," 1876; "Mater Admirabilis," 1882; "After Weary Years," a tale, 1887; "Saint Agnes, Virgin and Martyr," 1887; "Aminta," a poetic drama, 1890; "Memoir of Bishop Burke," 1894. His contributions to the Royal Society are: "The Supernatural in Nature," 1894; "Presidential Address," 1897; "Cabot's Landfall and Chart," 1899.

A more unassuming man never filled so high a position; a more modest man has seldom possessed so many talents and so much learning; and a man so welcome in every society had seldom lived a life so retired. Yet such is the occasional reward of unobtrusiveness, that the Archbishop was more popular than most public men, and better known among men of letters than many whose lives are devoted to publicity. His brethren of the Royal Society hasten, on the occasion of its first meeting since his death, to record their sorrow for his taking away, while at the same time they give expression to their admiration for the man of letters with whom they were all proud to be associated.

The death of Dr. George Stewart, at a comparatively early age, was deeply regretted, not only by the Society but by hundreds of friends outside of it. Dr. Stewart was a born *littérateur*, and the enthusiasm that inspired his youthful pen lasted till he ceased to write. One of his latest contributions to the periodical press was an article on Popular Songs of Old Canada, in *The Monthly Review*, of London, England. The earliest noteworthy writing with which his name is associated, was a tribute to the memory of the Hon. Thomas D'Arcy McGee in his own magazine, "Stewart's Quarterly." During the long interval between the publication of these two studies, Dr. Stewart was indefatigably at work, the products of his industry appearing in Canadian, American and British periodicals. A work that made him widely known, his history of the Great Fire of St. John, N.B. (1877), was also the occasion of his moving from that city to Toronto, where he became editor of *Belford's Magazine*. While taking charge of the *Quebec Chronicle*, of which for nearly twenty years he was editor-in-chief, he wrote his contributions to the "Canadian Portrait Gallery," to the "Encyclopædia Britannica," to "Appleton's Cyclopædia," to "Winsor's Narrative and Critical History of America," and to other well known works of reference. Before leaving Toronto he had written

his excellent account of the administration of the Earl (afterwards Marquis) of Dufferin. During his travels in Europe, Dr. Stewart had the advantage of introductions from Lord Dufferin to some of his friends, including Tennyson, the late Lord Lytton and other celebrities. He wrote in *The Cosmopolitan*, after the great poet's death, a sympathetic tribute to his genius and character. His reminiscences of Lord Lytton, the first Earl and Governor-General of India, were published in the *Canadian Magazine*. Dr. Stewart's purely literary papers—including his sketches of Carlyle, Longfellow, Holmes and Thoreau—were mostly delivered as lectures before the Literary and Historical Society of Quebec, of which he was for many years president. Others were published in the British reviews, Emerson the Thinker appearing in the *Scottish Review* in 1888. Altogether three volumes of essays were given to the public under his name—two of these (Essays from Reviews) coming out successively in 1892 and 1893. That Dr. Stewart should have been honoured by Canadian universities was not surprising, but that he should have received a doctorate from four of them (Laval, McGill, King's, Windsor, N.S., and Bishop's, Lennoxville, P.Q.) bears witness to his wide popularity. He was one of the charter members of this Society and for more than a dozen years bore the office of secretary to Section II. He contributed a paper on the Early Sources of Canadian History to the 3rd Volume of our Transactions.

The death of Mr. Charles Baillargé occurred unexpectedly on May 10. His correspondence with the Secretary as late as April 5 manifested an active interest in the approaching meeting of the Society. He was born at Quebec in 1827 of a family of engineers and artists and early developed an unusual capacity for the mathematical sciences. From 1866 to about 1899 he was city engineer of Quebec, and for a time he was joint engineer in connection with the extensive harbour works carried out in the River St. Charles estuary by the Quebec Harbour Commission. His first training was as a land surveyor and for a long time he was Chairman of the Board of Examiners of Land Surveyors. On matters relating to the Mathematical and Physical sciences his aid and counsel were continually invoked by public bodies and by the Provincial and Dominion Governments. His skill as an architect is manifest in his native city, notably in the buildings of Laval University, the churches and buildings of the Sisters of Charity and of the Good Shepherd, the Music Hall, the Jail, the Monument des Braves at Ste Foye and in the aqueduct bridge over the St. Charles and the Dufferin Terrace. From 1863 to 1865 he was joint architect for the Parliament and Departmental Buildings at Ottawa.

During all his busy professional life he was an indefatigable writer and lecturer on his favourite subjects and he acquired a wide reputation beyond the limits of Canada. In 1874 he was summoned to France and presented with the gold medal of the Society of Popularization of instruction at the Conservatoire des Arts et Métiers and during his busy life he received fifteen medals and twenty diplomas from foreign countries. In 1880 he became a member of the Royal Academy of Arts and in 1882 one of the original members of the Royal Society of Canada.

Mr. Baillargé's writings are too numerous to be recounted here. They are catalogued in the Bibliography appended to Vol. XII. of the 1st Series of the Transactions of the Royal Society where they occupy five columns.

In the course of his long life, busy as it was and occupied with so many interests, scientific, literary, professional and social, Mr. Baillargé made no enemies. All were friends to him and he was at all times willing to be useful to any one who might ask for counsel or assistance in the varied subjects in which he was interested.

5.—NEW FELLOWS.

Letters of acceptance and thanks were received from the Most Reverend the Archbishop of Montreal, Dr. Doughty, Major Wood and Messrs. Errol Bouchette and C. C. James, who were elected at the last meeting.

6.—THE PROPOSED INTERIM BULLETIN.

The rules made last year with regard to the inauguration of a Bulletin to appear from time to time when papers of special importance called for immediate publication have not been brought into effect by the publication of any urgent paper. Efforts were made to get the separates of the scientific sections out early and fair success was achieved, but some of them were delayed in proofreading by the absence of their authors, and these delays blocked the progress of others. The practice of sending out several revises is fatal to despatch. After an author has seen a proof in galley and one revise no further proofs are really needed, and no alterations should be allowed. Some papers are, in fact, twice set. It would be quicker and far cheaper to type-write papers not properly prepared, and make printers' copy of the corrected transcripts.

7.—A HOME FOR THE SOCIETY.

At our last meeting a committee was appointed (p. xv.), consisting of Mr. Sulte, Sir James Grant, Capt. Deville, Lt.-Col. Denison, Dr. Fletcher, and Messrs. Lambe and Lighthall to wait upon the Govern-

ment with a view to securing accommodation in the Victoria Building now being erected.

Mr. Sulte, with Sir James Grant and Mr. Lambe called upon the Honourable the Minister of Public Works and were accorded a most satisfactory hearing. The following letter was subsequently received:

Office of the Minister of Public Works of Canada.

Ottawa, April 19th, 1906.

Sir:—

I am in receipt of your letter of the 3rd inst., which was left with the Deputy Minister of Public Works. I shall be very pleased, indeed, to give most favourable consideration to the request of the Royal Society, when additional space is secured by the erection of new departmental buildings.

Yours truly,

C. S. HYMAN.

Benjamin Sulte, Esq.,
Ottawa, Ont.

S.—THE PROPOSED VISIT OF OUR FOUNDER.

The Fellows will remember how unanimous was the wish of all who attended the last meeting that the founder of the Society, the Duke of Argyll, would favour this anniversary meeting by his presence. The council was not unmindful of this desire. The steps taken and the result are summarized in the following letters:

Ottawa, March 3rd, 1906.

To His Grace the Duke of Argyll.

K.T., G.C.M.G., etc., etc.,

My Lord Duke:

The Royal Society of Canada founded by Your Grace during your term of office as Governor-General of the Dominion will, at the next meeting, on May 21st, celebrate the twenty-fifth anniversary of its foundation, and, at the last meeting there was a universal desire that you would, if possible, favour the Society with your presence. The council advised Sir Sandford Fleming (who was then in England) of the wishes and hopes of the Fellows of the Society, and Sir Sandford communicated their wishes to you. The date you considered to be too distant to call for an immediate answer.

Many of the original members who had the honour of seeing Your Grace in the early years of the Society have passed away and their places are filled by others who are endeavouring to carry out the work

you planned. These are anxious to greet the founder of the Society and those who knew you in former years are eager to meet you once more. A visit from you, moreover, would be very helpful and stimulating to the future growth of the Society.

We therefore, now that the time of meeting approaches, wish again to express the hope of every member of the Society that you may be able to assist by your presence at the celebration of the twenty-fifth anniversary.

We have the honour to be,

Your Grace's most humble servants,

ALEXANDER JOHNSON,

President.

S. E. DAWSON,

Honorary Secretary.

Naples, March 23rd, 1906.

Dear Sir:—

It is with much regret I must relinquish any hope of meeting the members of the Royal Society on the 25th anniversary of the birth of the Society.

Let me thank you for your most kind invitation, and express my obligations to the Society for the annual gift of a copy of the "Transactions." The field of observation in Canada is so vast that these volumes have an ever greater interest. They will in future days be treasured by Canadians as showing that their country has been, ever since it became a united Dominion, abreast of scientific discovery and research in other lands. These volumes will show also how practical has been the working of the Society in welcoming literary men, and men of science, from all the provinces of Canada to its membership, and so labouring to enlist genius in every shape to develop and make known the immense material resources of Canada. All that constitutes hardihood and manliness will thrive with you. All tending to laziness and apathy will die. Strenuous thought and the results of action are represented by your Society, and the Press will know how to spread the papers contributed so that all may measure the successes attained in national endeavour.

Believe me, yours truly,

ARGYLL.

9.—INTERNATIONAL CONGRESS OF GEOLOGISTS.

It will be remembered that, in 1904, an invitation was sent (see Proceedings, 1904, p. vii.) to this body to hold its next meeting in 1906 at Ottawa. The invitation was sent in response to an intimation that it would be welcome. The Dominion Government promised the very liberal subsidy of \$25,000 and sent Dr. Bell to Vienna to advocate it. A formal invitation signed by the president and secretary on behalf of the society was forwarded in duplicate by successive mails, and a triplicate was sent by Dr. Bell. As set forth in the report of 1905 the Congress decided to hold their meeting in Mexico.

No communication from the Congress was ever received by the Royal Society with regard to this invitation. The decision arrived at was communicated verbally by Dr. Bell to the Honorary Secretary and embodied in the report of Council for 1905. It is superfluous to add that no intimation was received which might lead to the supposition that the question of a meeting at Ottawa was held in abeyance. It was simply dropped so far as the Royal Society were informed.

In November last the Secretary received the following letter:—

CONGRÈS GÉOLOGIQUE INTERNATIONAL.

Mexico, le 30 octobre 1905.

S. E. DAWSON, *Ecr.*,

Secrétaire Honoraire de la Société Royale du Canada,
Ottawa.

Monsieur et très honoré confrère:

Je prends la liberté de vous envoyer ci-jointe une copie de la lettre datée 30 août 1905, que j'ai eu l'honneur de vous adresser pour vous prier de prendre en considération dans le sein de votre Académie et près de votre gouvernement, le vœu exprimé au Congrès de Vienne, de recevoir au Canada la XI^e réunion du Congrès Géologique International en 1909.

Nous vous serions infiniment obligés si vous vouliez bien nous adresser votre bienveillante réponse, ce qui nous permettra, dans un cas favorable, d'annoncer la décision dans une des prochaines circulaires du Congrès de Mexico.

Veuillez agréer, cher confrère, l'assurance de nos sentiments les plus distingués.

Le Président du Comité d'organisation.

JOSÉ G. AGUILERA.

To which the Secretary replied as follows:—

Ottawa, le 6 novembre 1905.

M. José Aguilera,

*Secrétaire Honoraire du Comité d'Organisation
du Congrès Géologique,
Mexico.*

Cher Monsieur:

J'ai l'honneur d'accuser réception de votre lettre du 30 octobre demandant si la Société Royale du Canada serait en position d'inviter le Congrès Géologique International à venir se réunir dans la ville d'Ottawa en 1909.

Je regrette de ne pas être en position de vous donner une réponse définitive. Lorsque le Congrès Géologique International décida de s'assembler au Mexique, en 1906, la Société Royale du Canada crut l'incident clos. Je ne puis dire, non plus, si la Société serait disposée à renouveler son invitation. La prochaine réunion de la Société Royale du Canada n'aura lieu que le 24 mai 1906. Je ferai rapport à cette assemblée et vous ferai savoir la décision de la Société. Je ne crois pas qu'il soit possible de décider cette question plus tôt. Si le Conseil de la Société s'assemble avant cette époque, je lui soumettrai vos lettres, mais il n'est pas probable que le Conseil en vienne à une décision sans l'assentiment complet de la Société Royale du Canada.

J'ai l'honneur d'être

Votre obéissant serviteur,

S. E. DAWSON,

Secrétaire honoraire.

The correspondence was read at a meeting of council on January 10th, 1906, and the answer of the Secretary was approved.

During the last few days announcements have been made in the newspapers that the Congress will meet in Brussels in 1909.

10.—THE BRITISH ASSOCIATION.

When the subject of a meeting of the International Congress of Geologists was disposed of, as above set forth, the Royal Society, in its desire to further the best interests of the Dominion, took up the question of promoting a meeting of the British Association to be held

at Winnipeg in the heart of newest Canada. The proposition is set forth on page XXII. of the Proceedings of 1905-6, as follows:

At the meeting of the Royal Society of Canada, held on May 25th, 1905, it was

Moved by Reverend Dr. Bryce, seconded by Dr. G. U. Hay, and carried:—

“That the Royal Society of Canada, with a view to the spread of scientific knowledge, and also for the purpose of aiding in the development of newer Canada, suggests to the City of Winnipeg to invite the British Association for the Advancement of Science to hold its next meeting in 1907 in the City of Winnipeg; and also to invite a number of leading scientists of the continent of Europe and the United States; and appoints the following committee to wait upon the Dominion Government, the governments of Manitoba, Saskatchewan, Alberta, British Columbia, along with the City of Winnipeg and the other cities of the provinces named, with the object of obtaining grants and other assistance to assure the visit of the said association and enable it to carry out its important work.”

Committee.—The President of the society, the retiring President, Sir Sandford Fleming, Dr. Keefer, Sir James Grant, Lt.-Col. Denison, Archbishop O'Brien, W. D. Lighthall, Rev. Dr. Burwash, Professor Bovey, Dr. Saunders, the mover and seconder, with power to add to their number.

The committee met the same day and appointed the Rev. Dr. Bryce as Chairman.

Subsequently Professor A. B. Macallum was added to the committee.

The Rev. Dr. Bryce with the committee forthwith waited on the Premier, who kindly promised that the subvention originally intended for the International Congress would be transferred to the proposed visit of the British Association.

Dr. Bryce then obtained a certified copy of this resolution and with it he appeared before the Corporation of Winnipeg, with the result that the City Council unanimously resolved that:

Resolution of the City of Winnipeg.

“Whereas at the meeting of the Royal Society of Canada held on May 25th, 1905, the following motion was unanimously adopted:

(Here followed as a preamble a recital of the above resolution of the Royal Society; after which the Council proceeded.)

"Whereas the Committee waited on the Dominion Government and received the assurance that the Government will be disposed to entertain favourably the request that they should contribute to the reception of the British Association for the Advancement of Science should they visit Canada in 1907; and that they will be disposed to help to about the extent of the \$25,000 asked for; and

"Whereas the City of Montreal in 1884, and the City of Toronto in 1897, impressed with the importance of the visit of some five to eight hundred members of this greatest scientific body in the world in creating interest in Canada, and in disseminating information as to its resources in the British Isles and the Continent of Europe, each gave a grant from civic funds of \$5,000;

"Therefore, the City of Winnipeg, convinced of the importance of bringing so notable a body to the Canadian West, hereby cordially invites the British Association for the Advancement of Science to hold its annual meeting in 1907 in this city, and to accept the hospitality of its citizens, and the present council heartily recommends to their successors in that year to vote a sum for the carrying out of the purposes of the Society."

The Resolution was carried unanimously by the City Council, with understanding of a vote of \$5,000.

The present position of the matter is summarized in the following report by Dr. Bryce:

Report of the British Association Committee of the Royal Society.

Rev. Dr. Bryce, Chairman.

The Chairman regrets very much that he will be in Britain during the month of May, and hence cannot be present at Ottawa.

The committee appointed to invite the British Association begs to report:—

1. In Appendix A.—A copy of the resolution and the appointment of the committee. (See ante.)
2. In Appendix B.—Appeal made on behalf of the committee to the City Council of Winnipeg, asking them to invite the British Association.
3. In Appendix C.—A copy of Sir Wilfrid Laurier's letter.
4. In Appendix D.—The resolution of the City inviting the Association. (See ante.)
5. In Appendix E.—The invitation given by the Manitoba Historical and Scientific Society.

6. All the documents have been forwarded through Professor Macallum to the Association in South Africa, the accompanying map showing buildings available was sent also. (The Chairman would like this map returned to him as he has no other copy).
7. A letter was received from Professor Macallum stating that the Association could not come in 1907, but was prepared to accept the invitation for 1909.
8. A letter was received by the Chairman from Sir Wilfrid Laurier stating that the grant of 1907 would stand good for 1909.
9. The Chairman reports that he intends, when the date approaches a little nearer, to bring before the Governments of Manitoba, Saskatchewan, Alberta and British Columbia, as well as the cities of Regina, Calgary and Edmonton, Vancouver and Victoria, the desirability of the Association being taken through to the coast, and that this will somewhat depend on whether the amounts voted are sufficient to meet the expense.
10. The Chairman met the authorities of the Canadian Pacific Railway and they are favourable to the project and will be prepared to manage, along with the other railways, matters of transportation without much trouble to the Royal Society, *i.e.*, after the principles of action have been agreed on by the committee and the railway.
11. In 1908 it is proposed to constitute a local committee in Winnipeg to carry out the details of management which may be necessary.
12. The Chairman, while in England, expects to meet the officials of the British Association and have an understanding on the matter.

All of which is respectfully submitted.

GEORGE BRYCE,
Chairman.

Winnipeg, March 12th, 1906.

Since then the Secretary received the following letter:—

Winnipeg, April 24th, 1906.

S. E. Dawson, Esq.,
Secretary Royal Society.

My dear Sir:—

Our University has taken action. Will you kindly amend my report adding the following:

The University of Manitoba has resolved to cordially support the City in its invitation for 1909.

I inclose also a copy of the resolution of the University, which will be signed by the Vice Chancellor and Registrar. The seal will be affixed and the document forwarded to England.

As soon as I reach London, which will be about the middle of June, I will see the secretaries, etc., of the British Association.

I trust you may have a pleasant meeting of the Society in May.

I sail on May 12th according to present outlook.

I am, yours truly,

GEORGE BRYCE.

Resolution of the University (Inclosed).

“To the British Association for the Advancement of Science:

“The Council of the University of Manitoba has been informed that the City of Winnipeg, at the suggestion of the Royal Society of Canada, which had obtained the promise of a large grant from the Dominion Government for the purpose of providing for the British Association, passed and forwarded to the meeting of the British Association in South Africa the following resolution:

“‘The City of Winnipeg convinced of the importance of bringing so notable a body to the Canadian West, hereby cordially invites the British Association for the Advancement of Science to hold its Annual Meeting in 1907 in this City, and to accept the hospitality of its citizens, and the present Council heartily recommends to their successors in that year to vote a sum for the carrying out of the entertainment of the Society.’

“The information has reached the University through Professor Macallum, of Toronto (who presented the matter to the Association in South Africa), that there is a likelihood of the Association accepting the invitation in 1909, and further, the University is informed that the Dominion Government and the City of Winnipeg will hold to the promise of 1907 for the year 1909.

“Therefore, the University of Manitoba heartily endorses the invitation of the City of Winnipeg and earnestly requests the British Association to visit Western Canada — the home to which large numbers of British people are turning their eyes as settlers at the present time.

“The University appoints Rev. Dr. Bryce and Prof. Parker its representatives to bring this matter before the British Association.”

The matter is in able and energetic hands and the Council recommends that the committee be continued.

11.—MEETING OF METEOROLOGISTS.

In the early part of the present year the Secretary had some correspondence with Mr. R. F. Stupart of the Meteorological Service of Canada — one of the Fellows of the Society — in relation to a proposed meeting of meteorologists at Ottawa. The letters themselves will best set forth the subject.

METEOROLOGICAL OFFICE.

Toronto, December 6th, 1905.

Dear Dr. Dawson:—

At the meeting of the B. A. H. S. in Southport, 1904, Sir John Eliot, late Meteorological Reporter for India, advocated the organization of a central Meteorological Department for the British Empire and the matter was again brought up in the B. A. meeting in Cape Town this year. In September last at Innsbruck I discussed with Sir John Eliot and Dr. Shaw, the Chief of the British Meteorological Service, the feasibility of having a meeting of British and Colonial Meteorologists in Canada to consider the whole question. While no definite conclusion was arrived at, I am sure they are expecting some proposal from me. Due consideration has convinced me that there would be small chance of getting representatives from Australia and the Cape, etc., to come here for a meeting, and I have been wondering whether it would not be possible for the Council of the Royal Society of Canada at my request to invite certain British and Colonial Meteorologists to attend the next Royal Society meeting in Ottawa — there to discuss desirable co-operation between the Royal Society of Canada and other scientific societies within the Empire, as regards meteorological problems. I think that Sir John Eliot, F.R.S., and Dr. W. N. Shaw, F.R.S., and probably Sir Norman Lockyer would, on invitation, attend such meeting. I feel sure you will be able to tell me off-hand whether such a suggestion can be carried out, hence I venture to trouble you.

Yours sincerely,

R. F. STUPART.

Dr. S. E. Dawson,

*Hon. Secretary Royal Society of Canada,
Ottawa.*

METEOROLOGICAL OFFICE,

Toronto, January 12th, 1906.

Dear Dr. Dawson:—

I desire to thank you for having brought the subject of my letter of December 6th before the Council of the Royal Society. Whatever

may be done it must be made quite clear to all who are invited that they will have to pay their own expenses, or rather that their expenses should be borne by the Imperial and various Colonial Governments which they represent. I enclose herewith a copy of a letter from Dr. Shaw, from which it is evident he will not be satisfied with a meeting of just a few from Great Britain and suggests that a circular be sent to all the Colonies asking whether they were willing to send representatives to discuss meteorological problems from an Imperial standpoint.

If this be done a meeting in May next is quite out of the question—but might well be arranged for May, 1907. I do think that such a meeting is altogether desirable, and would like to have it in Canada, and the Royal Society being willing to further the scheme it will, I think, be quite possible to carry it out.

If then you will leave the matter in abeyance for the present, I will write unofficially to my meteorological colleagues in the various parts of the Empire and ask whether if such a meeting were arranged for, they would be willing to attend.

Yours very truly,

R. F. STUPART,

Director.

Dr. S. E. Dawson,

Secretary Royal Society of Canada.

Ottawa.

The Council recommends that the correspondence be referred to Section III. for consideration and report.

12.—THE CELEBRATION AT ST. MALO.

The celebration at St. Malo in commemoration of Jacques Cartier took place on July 23rd, 1905, as announced in the report of Council in May of that year. No one had been deputed to attend; but Sir Sandford Fleming, who was then in England, kindly wrote to offer his services. The formal letter was, however, too late to reach him in time, and it was addressed directly to the President of the Committee at St. Malo. It was as follows:—

Ottawa, 20 juin 1905.

Monsieur le Président,

La Société Royale du Canada est heureuse de pouvoir se faire représenter auprès du comité Jacques Cartier, de Saint-Malo, à l'occasion de la pose d'une plaque commémorative de la découverte du Canada, le 23 juillet prochain. Afin que vous puissiez juger de l'intérêt que nous portons à cette fête, je dirai que la moitié de nos membres se livrent aux études historiques concernant le Canada, et que par consé-

quent nous sommes en communauté d'idées avec vous sur tout ce qui rappelle les travaux du découvreur. Il va de soi que nous avons très hautement apprécié les efforts des citoyens de Saint-Malo pour honorer la mémoire d'un grand homme que les Canadiens de toutes les origines respectent et saluent toujours comme l'un de leurs, ainsi que l'attestent nos écrits, son portrait répandu partout, son nom donné à des divisions territoriales, à une de nos villes, à une banque, à des rivières, lacs, navires, rues et places publiques dans notre pays.

En députant auprès de vous un ancien Président qui appartient à la section des sciences de notre institution, le dévoué Sir Sandford Fleming, l'un des hommes les plus distingués du Canada, nous exprimons de la manière la plus honorable et la plus empressée notre participation au sentiment qui anime nos cousins de France pour la mémoire de Jacques Cartier, comme aussi au rapprochement qu'il opère entre nous tous, après plus de trois siècles, et malgré la distance qui nous sépare.

N'oublions pas que si la moitié des équipages du fameux Malouin dorment dans la terre de France, l'autre moitié reposent chez nous dans le sol de la ville de Québec, près du monument que nous avons élevé pour faire comprendre au peuple la courageuse entreprise de ces marins. J'ajoute ici que l'on se tromperait grandement en France si l'on s'imaginait que cette vénération est particulière aux Canadiens-Français; elle est universelle dans toutes nos provinces, comme le prouvent nos livres d'école, nos billets de banque, etc., bien qu'elle soit plus intense, naturellement, au milieu du groupe de langue française, qui a aussi conservé jusqu'à présent les lois civiles de l'ancienne mère-patrie et tant de coutumes que vous seriez étonné de voir dans cette Nouvelle-France du XVII^e siècle.

Nous travaillons donc pour la même cause. Ce qui, pour vous, constitue une gloire nationale l'est également pour les Canadiens. Nous sommes heureux, je le répète, de témoigner en cette circonstance combien nos populations apprécient votre œuvre et d'autre part nous sommes fiers de l'honneur que votre invitation confère à notre Société.

Je demeure, Monsieur le Président,

Votre tout dévoué serviteur,

ALEXANDER JOHNSON.

Monsieur Louis Tiercelin,

Président du comité Jacques Cartier,

Ker-Azur, Paramé (Ille et Vilaine),

France.

The letter was courteously acknowledged by the President of the Committee.

13.—OTHER COMMITTEES.

The Council has to report that the Committee on Ethnographic research which was appointed in connection with the British Association has abandoned its efforts and is sending no report.

No report has been received as yet from the Committee on Geological Nomenclature.

The Committee on a Hydrographic Survey of our coasts sends the following:

Final Report of the Committee on the Coast Hydrographic Survey.

Consisting of Mr. Sulte, Sir Sandford Fleming, Dr. T. C. Keefer, Dr. Loudon, Dr. Bovey, Prof. McLeod and Dr. Johnson (Chairman):—

In the report of last year, 1905 (page x. of "Proceedings"), it is said:—"The Committee has great reason to hope that".....
"the efforts of the society which at the end of six years secured the "Tidal Survey, will now, after twenty-one years, be crowned with complete success," i.e., in the establishment of a Coast Hydrographic Survey.

The committee has the great satisfaction of announcing that the society has now fully attained this object, and that a vote was passed by Parliament last year for the sum of \$264,500, to be applied in providing one steamer for the Atlantic Coast (additional to that for the Tidal Survey), one for the Pacific, and for general expenses and maintenance.

Of the value of this survey to Canada sufficient has been already said.

The committee having thus fulfilled its duty, it hopes to the contentment of the society, asks to be discharged.

(Signed on behalf of the Committee),

ALEXANDER JOHNSON,

Chairman.

April, 1906.

The Committee on a Geodetic Survey of Canada reports as follows:—

Montreal, May 16th, 1906.

Report by the Chairman of the Geodetic Surveys Committee.

The Committee on Geodetic Surveys has not made any further representation to the Dominion Government. It notes, however, that this important matter has now been taken up by the Canadian Society of Civil Engineers, which, at its annual meeting in January last, adopted the following resolution:

“Resolved, that the council be instructed to represent to the Dominion Government the importance of action in the direction of a more complete co-ordination of the various surveys conducted by its departments and the adoption of such methods as will secure permanent records both in the field and in the office of all such work. In the opinion of this meeting, the complete working of a scheme will involve very careful study not only of the valuable work now being done, but also of the methods which have been adopted by the government of other countries, and should lead to the establishment of a general topographical and geodetic survey scheme for the whole Dominion.”

The Engineers' Society has called the attention of the Government to the resolution quoted above, in an appropriate memorandum presented by deputation to Sir Wilfrid Laurier, Premier, and it is hoped that through this co-operation, some progress will shortly be made toward placing the surveys of Canada on a rational basis.

C. H. McLEOD,

Chairman of Geodetic Surveys Committee.

14.—BIOLOGICAL STATIONS.

The station on the Georgian Bay is now under the management of the Department of Marine and Fisheries, and Professor Prince has made it the subject of a special report. He has also contributed a detailed report on the work of the Marine Biological Station which, during the past year was located at Gaspé. These reports will be printed as Appendix C to the Report of Council.

15.—TIDAL SURVEY.

Dr. W. Bell Dawson has favoured the Society with his usual annual report on the Survey of the Tides and Currents on the coasts of the Dominion. It will be printed at the end of the Report of Council (Appendix D).

16.—INVITATION TO ABERDEEN.

The University of Aberdeen having been unable, for various reasons, to celebrate in 1894 the four hundredth anniversary of the foundation of King's College, intends, with the aid of the citizens of Aberdeen, to commemorate on September 15th, 1906, not only the foundation of King's but also of Marischal College, and at the same time to inaugurate some recently erected academic buildings. The occasion has appealed strongly to the people of Aberdeen. Great preparations have been made for it, and His Majesty the King is expected to be present. An invitation in Latin and printed in the black letter text of the fifteenth century has been received by the Society requesting that a representative be sent to assist at the ceremonies. It is signed

by the Vice-Chancellor and President, and is specially addressed to the Royal Society of Canada.

17.—INTERNATIONAL CONGRESS OF AMERICANISTS AT QUEBEC.

The following letter has been received and the Council recommends that it be referred to Section I. for consideration and report:

Ottawa, 28th April, 1906.

Dr. S. E. Dawson, F.R.S.C., etc.,

Hon. Secy. Royal Society of Canada.

Ottawa.

Sir,

The Committee of Organization of the International Congress of Americanists, which is to hold its Fifteenth (15th) Meeting in the City of Quebec, from the 10th to the 15th of September of the present year, has the honour to invite the Royal Society of Canada to appoint a delegate or delegates to represent it at this meeting.

Will you have the kindness to mention this in your annual report and to bring the matter officially before the Royal Society at its annual meeting in May?

I have the honour to be, Sir,

Your obedient servant,

ROBERT BELL.

President.

18.—ASSOCIATED SOCIETIES.

The following Associated Societies have sent in reports:

SOCIETY.	PLACE.	DELEGATE.
Women's Canadian Historical Society of Toronto.....	Toronto.....	.....
Natural History Society of Montreal.....	Montreal.....	Dr. A. Nicholls.
Le Cercle Littéraire de Montréal.....	do	Dr. H. M. Ami.
Literary and Historical Society of Quebec.....	Quebec	P. B. Casgrain.
Nova Scotia Institute of Science.....	Halifax.....	Dr. Henry S. Poole.
Ottawa Field Naturalists Club.....	Ottawa.....	W. J. Wilson.
Nova Scotia Historical Society.....	Halifax .....	.....
Botanical Club of Canada.....	do	Dr. A. H. MacKay.
Numismatic and Antiquarian Society of Montreal.....	Montreal.....	R. W. McLachlan.
Natural History Society of New Brunswick.....	St. John	Hon. Senator Ellis.
Canadian Institute.....	Toronto.....	.....
Entomological Society of Ontario.....	London.....	A. F. Winn.
Literary and Scientific Society of Ottawa.....	Ottawa.....	A. H. Whitcher.
Women's Canadian Historical Society of Ottawa.....	do	Mrs. O'Connor..
Historical and Scientific Society of Manitoba.....	Winnipeg.....	.....
Niagara Historical Society.....	Niagara.....	Miss Carnochan.
Scientific Association.....	Hamilton.....	Dr. Fletcher.

Resolutions as follows were then passed:—

Moved by Dr. J. E. Roy, seconded by Mr. B. Sulte, and carried:—

That the report of Council, just read, be adopted.

Moved by Dr. E. Deville, seconded by Dr. Saunders, and carried:—

That the minutes of the last annual meeting as printed in the volume of Proceedings and Transactions be confirmed.

Moved by Dr. E. Deville, seconded by Prof. Baker, and carried:—

That the following be a committee for the nomination of officers for the Society for the following year:—Dr. Johnson, Dr. J. E. Roy, Sir Sandford Fleming, Lt.-Col. Denison, Mr. L. M. Lambe.

It was then moved by Sir Sandford Fleming, and seconded by Mr. B. Sulte:

That a special committee be appointed to consider the question of the adoption of the metric system in Canada and in other non-metric countries and report thereon to the Society at its next general meeting. That the special committee consist of Dr. J. E. Roy, Mr. George Murray, Professor Baker, Dr. H. S. Poole, along with the mover and four supporters of the motion.

(The said supporters were Mr. B. Sulte, Lt.-Col. Denison, Dr. Keefer, Sir James Grant.)

A debate having arisen, Dr. A. B. Macallum, seconded by W. W. Campbell, moved in amendment,

That all the words after the word “that” be omitted to substitute the words “a committee of seven, the majority of which is to be constituted of members of the two sections, Mathematical-Physical and Geological-Biological, be appointed to consider and report on the whole question of the metric system.

On a division the amendment was carried.

The following committee was nominated by the President:—Sir Sandford Fleming, Dr. Rutherford, Dr. Macallum, Dr. Ellis, Lt.-Col. Denison, Archbishop Bruchési and Mr. Sulte.

Dr. E. Deville gave notice of his intention to move the following change in the Regulations:—

It is proposed to repeal the last paragraph of clause 7, reading as follows:—

“Any member failing to attend three years in succession, without presenting a paper, or assigning reasons in writing satisfactory to the Society, shall be considered to have resigned.”

And to substitute the following paragraph:—

“Any member who has failed to attend the three preceding annual meetings without presenting a paper, shall be placed on the retired

list and an election to fill the vacancy thus created shall be held in the manner prescribed by these regulations for filling vacancies; provided that the Society may, upon the recommendation of the section to which such member belongs, suspend action under this rule until the next annual meeting."

At noon the Society adjourned to enable the sections to organize in their respective rooms.

AFTERNOON SESSION. (Tuesday, May 22).

The Society reassembled in general session at 2.30 p.m.

Delegates of associate societies were then called upon for their reports. These will be found in Appendix E printed in full.

The report of the Women's Canadian Historical Society of Ottawa was read by Mrs. O'Connor.

The report of the Literary and Scientific Society of Ottawa was read by Mr. A. H. Whitcher.

The report of the Natural History Society of New Brunswick was read by Hon. Senator Ellis.

The report of the Ottawa Field Naturalists Club was read by Mr. W. J. Wilson.

The report of the Nova Scotian Institute of Science was read by Dr. H. S. Poole.

The Rev. G. W. Taylor, of Nanaimo, who attended the meeting of the Society for the first time, was presented to the President and took his seat.

The Society adjourned at 3.30 p.m.

EVENING SESSION. (Tuesday, May 22).

At 8 p.m. the President delivered his Presidential Address in the large hall of the Normal School. Subject: "Our Semi-Jubilee and Canada. (*Vide* Appendix A).

SESSION II. (Wednesday, May 23.)

The Society reassembled in general session at 11.30 a.m.

Moved by Lt.-Col. Denison, seconded by J. S. Willison, and carried:—

That the Society desires to record its sincere regret that His Grace the Duke of Argyll, the founder of the Society, has been unavoidably prevented from being present at this twenty-fifth anniversary of its foundation; being sure that His Grace would have been pleased with

the progress of the Society and with the great development of the country.

The report of the Quebec Literary and Historical Society was read by its president, Mr. P. B. Casgrain.

Moved by Dr. Alex. Johnson, seconded by B. Sulte, and carried:—

That the Royal Society of Canada in annual meeting assembled desires to express its deep regret at the recent sudden death of Professor P. Curie, who had won so much glory for France and given so much pleasure to the world by his eminent discoveries in science:— that the Society offers its earnest sympathy to his widow, Madame Curie, the sharer of his labours and successes, partner of his heart and mind, adding her own scientific fame to the fame accorded both for their joint work:— and that the Society hopes that strength and health and length of days will be given her to continue for the benefit of the world, the work in which the partnership has been so suddenly severed, and to attain further success as a tribute to his memory and a solace for her sorrow.

It was then moved by Dr. Johnson, seconded by Hon. Senator Poirier, and carried:—

That a committee be appointed to communicate with His Excellency the Governor-General, as Honorary President of the Society, and request him to favour the Society by transmitting the above resolution in the most suitable manner to Madame Curie, preferably through the President of the French Republic.

After the resolution was carried, Sir Sandford Fleming and Sir James Grant were named as the Committee.

Moved by Prof. D. P. Penhallow, seconded by Sir James Grant:

That the Royal Society of Canada memorialize the Government with a view to receiving a grant of \$5,000 annually, to be expended in the promotion of original research in such ways and under such conditions as may be determined by the Royal Society acting through a special committee to be appointed for that purpose, and that the Society appoint a special committee to frame and present such memorial at the earliest opportunity.

Moved in amendment by Mr. Thomas Macfarlane, seconded by Prof. Macoun:—

That the resolution, before being deliberated on by the Society, be referred to the Council for consideration.

The amendment was lost and the main motion was then put to the meeting and carried. Sir James Grant, Sir Sandford Fleming and Professor Prince were then named as a committee.

Moved by Lt.-Col. Denison, seconded by Professor Macoun, and carried:—

That Mr. William Wilfred Campbell be appointed to represent the Society at the anniversary meeting of the University of Aberdeen in September next.

The report of the Natural History Society of Montreal was then read by Dr. Nicholls.

The report of the Entomological Society of Ontario was read by Mr. Albert F. Winn.

The report of the Numismatic and Antiquarian Society of Montreal was read by Mr. R. W. McLachlan.

A report on behalf of the Hamilton Scientific Association was made verbally by Dr. James Fletcher.

The Secretary of Section II. then presented the following:

REPORT OF SECTION II.

Section II. has the honour to report that some interesting meetings were held, the attendance being greater than the average for some years past.

Several papers were read, a list of which is appended to this report.

The following gentlemen were nominated members of the section to fill up the vacancies:

Professor Shortt, J. H. Coyne, James Hannay, Rev. W. O. Raymond, Lt.-Col. Cruikshank.

The officers of the section elected are:

President—Chancellor Burwash.

Vice-President—Dr. A. G. Doughty.

Secretary—W. Wilfred Campbell.

Printing Committee—The Vice-President, Secretary, and Mr. W. D. Lighthall.

The section has arranged for a series of valuable papers to be read at its future meetings.

W. W. CAMPBELL,

Secretary.

List of Papers Read.

1.—“Sketch of the Life of Joseph Fleury Mesplet, the early Canadian printer.” By R. W. McLachlan. Presented by Dr. S. E. Dawson.

2.—“Richard Maurice Bucke, Philosopher, Scientist and Littérateur.” By James H. Coyne, M.A. Presented by Wilfred Campbell.

3.—“Additions and Corrections to Monographs on the Place-Nomenclature, Cartography, Historic Sites, Boundaries and Settlement-Origins of the Province of New Brunswick. (Contributions to the History of New Brunswick, No. 7).” By William F. Ganong, M.A., Ph.D. Presented by Dr. S. E. Dawson.

4.—“The Birds met with by Cartier on the North-Eastern Coast of America and especially of the Great Auk, now extinct.” By Dr. S. E. Dawson.

5.—“The Ter-centenary of the Founding of Port Royal, by De Monts.” By Dr. J. W. Longley.

6.—“The Celtic Revival, by the Rev. Father O’Boyle, O.M.I.” Presented by Wilfred Campbell.

It was then moved by Dr. S. E. Dawson, and seconded by Dr. A. G. Doughty:

That the nominations embodied in the report of Section II. be acceded to and that Rule 6, relating to the election of members, be suspended.

As under Rule 19 this motion required a majority of two-thirds of all present, a standing vote was taken. The motion was carried with only one dissentient.

Moved by Mr. W. W. Campbell, seconded by Mr. C. C. James, and carried:—

That Mr. J. H. Coyne, M.A., be elected a Fellow of the Society in Section II.

Moved by Mr. C. C. James, seconded by Mr. W. W. Campbell, and carried:—

That Lt.-Colonel E. Cruikshank be elected a Fellow of the Society in Section II.

Moved by Dr. S. E. Dawson, seconded by Dr. A. G. Doughty, and carried:

That the Rev. W. O. Raymond be elected a Fellow of the Society in Section II.

Moved by W. W. Campbell, seconded by Mr. J. S. Willison, and carried:—

That Professor Adam Shortt be elected a Fellow of the Society in Section II.

Moved by Dr. A. G. Doughty, seconded by Mr. W. W. Campbell, and carried:

That Dr. James Hannay be elected a Fellow in the Society in Section II.

The report of Le Cercle littéraire de Montréal was presented by Dr. Ami.

The Society then adjourned.

EVENING SESSION. (Wednesday, May 23).

At 8 p.m. in the large hall of the Normal School,*Mr. C. C. James delivered the annual popular lecture, having chosen for his subject "The Downfall of the Huron Nation." The lecture was illustrated by many stereopticon views of the localities in which the events he described occurred and by the reproduction of old maps throwing light on the geography of the early days of Canada.

SESSION III. (Thursday, May 24.)

The Society reassembled in general session at 2.30 p.m.

Moved by Mr. L. M. Lambé, seconded by Dr. S. E. Dawson, and carried:—

That the hearty thanks of the Society are tendered to Principal White for the kind and considerate manner in which he has opened the Normal School Building to the Society and has afforded every facility, not only for the general meetings, but for the meetings of Sections.

Moved by Mr. B. Sulte, seconded by Lt.-Col. Denison, and carried:—

That the Society desires to express its sincere thanks to Mr. C. C. James for his able and interesting lecture on "The Downfall of the Huron Nation," and its appreciation of the labour and time he has expended in the preparation, not only of the lecture, but also of the illustrative views.

Moved by Sir Sandford Fleming, seconded by Mr. Thomas Macfarlane, and carried:—

That the Society hereby tenders to Dr. Saunders and to Dr. King its sincere thanks for the courtesy with which they have thrown open respectively the Experimental Farm and the Dominion Observatory to the Fellows and delegates attending the present meeting.

The Special Committee on the Metric System then presented the following: —

REPORT.

The Special Committee appointed to consider the subject of the Metric System submitted to the general meeting on May 22, begs leave to report:

The Committee hesitates to express an opinion on the merits of the proposal submitted to the Society respecting the adoption of a

forty inch metre. This is the first time this subject has been brought before the Royal Society, and while at this stage it is considered best for the Society to remain uncommitted to any particular opinion, as the new proposal invests the whole question of the metric system with increased interest, it seems highly proper for the Society to approve of means being taken to promote inquiry and investigation. The Council should therefore be authorized and requested to take such means in its discretion, and if it may seem advisable to bring the matter to the attention of the authorities and the public.

Whereupon it was moved by Sir Sandford Fleming, seconded by Mr. Sulte, and carried:—

That the report of the committee be adopted.

Moved by Sir Sandford Fleming, seconded by Sir James Grant and carried:—

That the Honorable Senator David be added to the committee on memorializing the Government for a grant of \$5,000 annually to be expended on original research.

The Secretary of the Section, Dr. Deville, then presented the

REPORT OF SECTION III.

The Third Section submits the following report for the session of 1906:—

The section has held four meetings at which seventeen members were present as follows:—

Prof. Alfred Baker, President; Dr. H. F. Barnes, Dr. W. B. Dawson, Dr. E. Deville, Dr. W. H. Ellis, Sir Sandford Fleming, Dr. G. P. Girdwood, Dr. J. C. Glashan, Dr. G. C. Hoffmann, Dr. A. Johnson, Dr. T. C. Keefer, Prof. Lash Miller, Mr. T. Macfarlane, Prof. C. H. McLeod, Prof. R. B. Owens, Prof. E. Rutherford, Mr. F. T. Shutt.

Letters were received from the following members expressing regret for their absence:

Prof. H. T. Bovey, Prof. N. F. Dupuis, Dr. W. L. Goodwin, Dr. B. J. Harrington, President J. T. Loudon, Prof. J. C. McLennan, Mr. R. F. Stupart.

Twenty-three papers were read either in full or by titles; a list of the papers is appended.

The officers elected for the ensuing year were:

President—Prof. E. Rutherford.

Vice-President—Prof. W. Lash Miller.

Secretary—Dr. E. Deville.

A publication committee consisting of the officers of the section, Prof. McLeod and Dr. Glashan was appointed.

With regard to the proposal to invite the various officials of the Meteorological Departments of the Empire to meet in Ottawa in 1907, which proposal was referred to Section III., it is the opinion of the section that before making a recommendation, it is desirable that correspondence be entered upon with these officials with a view of settling the most suitable place and time for meeting and the questions to be discussed, and that in the meantime action should be deferred, and Mr. Stupart requested to conduct such correspondence.

E. DEVILLE,
Secretary.

List of Papers Read.

1.—Presidential Address. "The Foundations of Geometry." By Prof. Alfred Baker.

2.—"Abacus of the Altitude and Azimuth of the Pole Star." By Dr. E. Deville.

3.—"Notes sur la mécanique Céleste, les Mathématiques, le Calcul différentiel et l'Algèbre, par le Dr. Arthur Duval. Présentées par M. Benjamin Sulte.

4.—"On the Metallic Currency of the British Empire." By Thomas Macfarlane.

5.—"On the Analysis of Wheaten Flour." By Thomas Macfarlane.

6.—"On the Conservation of Nitrogen in Manure." By Thomas Macfarlane.

7.—"A new form of Frequency Indicator." By Prof. R. B. Owens.

8.—"Differential Temperature Records in Meteorological Work." By Prof. C. H. McLeod and Dr. H. T. Barnes.

9.—"An Aluminium and Magnesium Cell." By Mr. G. H. Cole and Dr. H. T. Barnes.

10.—"Nocturnal Radiation." By Dr. H. T. Barnes.

11.—"Radiation as the Cause of Anchor Ice Formation." By Dr. H. T. Barnes.

12.—"The Effect of Tensile Stress on Specific Resistance." By Mr. R. W. Boyle. Presented by Dr. H. T. Barnes.

13.—"Effect of an Electric Current on the Modulus of Elasticity." By Mr. R. W. Boyle. Presented by Dr. H. T. Barnes.

14.—"On Deficient Humidity of the Atmosphere." By Dr. T. A. Starkey and Dr. H. T. Barnes.

15.—"Mass of the α Particles Expelled from Radium." By Prof. E. Rutherford, F.R.S.

16.—“Some Peculiar Effects resulting from the Distribution of the Intensity of the Radiation from Radioactive Sources.” By Prof. E. Rutherford, F.R.S.

17.—“A New Product of Actinium.” By O. Hahn, Ph.D. Presented by Prof. Rutherford.

18.—“The Origin of the β rays from Radioactive Substances.” By W. Levin, Ph.D. Presented by Prof. Rutherford.

19.—“Isomorphism as Illustrated by Certain Varieties of Magnetite.” By Dr. B. J. Harrington.

20.—“An Investigation on the Value of the Indentation Test for Steel Rails.” By H. K. Dutcher, M.Sc. Presented by Dean Henry T. Bovey.

21.—“On the Effect of Dissolved Gases on Metal Surfaces.” By Dr. H. M. Tory. Presented by Dr. H. T. Barnes.

22.—“On Vectors considered as Numbers affected with Sign and Bearing.” By Dr. J. C. Glashan.

23.—“A Method of determining the Specific Heat of Gases.” By Dr. H. T. Dawes. Presented by Prof. J. C. McLennan.

The Secretary of the Section, Mr. Lawrence M. Lambe, presented the

REPORT OF SECTION IV.

Section IV. begs to report that its sessions, four in number, have been unusually well attended, and the number of papers presented larger than for some years past.

The average attendance of members of the section was eighteen, there being also a number of visitors from other sections and from the general public.

Twenty-nine papers in all were read before the section, in full, in abstract or by title, four of these being presented by gentlemen not members of the Society.

Some most interesting discussions took place on points suggested by many of the papers.

The following officers were elected for the coming year:—

President—Professor Edward E. Prince.

Vice-President—Professor Frank D. Adams.

Secretary—Mr. Lawrence Lambe.

LAWRENCE LAMBE,

Secretary.

List of Papers Read.

- 1.—“On the Sleeping Sickness”; with Microscopic Illustrations.
By Sir James Grant.
- 2.—“Illustrations of the Fossil Fishes of the Devonian Rocks of Canada.” Part III. By Dr. J. F. Whiteaves.
- 3.—“Bibliography of Canadian Zoology, exclusive of Entomology, for the year 1905.” By Dr. J. F. Whiteaves.
- 4.—“Bibliography of Canadian Botany, for the year 1905.” By Dr. A. H. MacKay.
- 5.—“Report of the Botanical Club of Canada, including Phenological Observations for the year 1905.” By Dr. A. H. MacKay.
- 6.—“New Points in the Structure and Development of the Pharyngeal Teeth in Fishes.” By Professor Edward E. Prince.
- 7.—“The Form and Structure of Lamp-organs in certain Fishes.” By Professor Edward E. Prince.
- 8.—“On Amyzon Brevipinne, Cope, from the Amyzon beds of the Southern Interior of British Columbia.” By Lawrence M. Lambe.
- 9.—“Review of the Flora of the Little River Group, Part I., the Calamariæ.” By Dr. G. F. Matthew.
- 10.—“Notes on Tertiary and Cretaceous Plants.” By Professor D. P. Penhallow.
- 11.—“A Remarkable Outgrowth from the Trunk of a White Birch.” By Professor D. P. Penhallow.
- 12.—“Bibliography of Canadian Geology and Palæontology for the year 1905.” By Dr. H. M. Ami.
- 13.—“Gypsum Deposits of New Brunswick, with special reference to their Origin.” By Professor L. W. Bailey.
- 14.—“Features of the Continental Shelf off Nova Scotia.” By Dr. H. S. Poole.
- 15.—“Note sur les Bassins Hydrographiques des Rivières Montmorency et Ste-Anne.” By Abbé J. C. K. Laflamme.
- 16.—“Critical Notes on the Geometridæ of British Columbia”; with descriptions of fourteen species. By Rev. G. W. Taylor.
- 17.—“Notes on the Mineral Fuels of Canada.” By Dr. R. W. Ells.
- 18.—“Some Unsolved Problems in Immunity.” By Dr. A. G. Nicholls. Presented by Prof. Wesley Mills.
- 19.—“Bibliography of Canadian Entomology for 1905.” By Rev. Dr. C. J. S. Bethune.
- 20.—“Some Experimental Investigations into the Flow of Rocks.” By Professor Frank D. Adams.

21.—“South African Iron Formations.” By Professor A. P. Coleman.

22.—“Studies in Canadian Fungi.” 1.—“The Imperfect Fungi.” By John Dearness. Communicated by Dr. G. U. Hay. 2.—“The Hydnums and their Allies.” By Dr. G. U. Hay.

23.—“Observations on and Criticism of Microchemical Methods.” By Dr. A. B. Macallum.

24.—“A Chapter in Comparative Physiology and Psychology.” By Dr. T. Wesley Mills.

25.—“The Structure of the Mesogloea in the Medusæ, Aurella Flavidula and Cyanea Arctica.” By Dr. A. B. Macallum.

26.—“Distribution of Bacteria in Canadian Cheddar Cheese.” By Prof. F. C. Harrison. Presented by Dr. Fletcher.

27.—“Legume Bacteria.” By Prof. F. C. Harrison. Presented by Dr. Fletcher.

28.—“On the Structure of an Abnormal Chick Embryo.” By Professor R. Ramsay Wright.

29.—“On some Fossils from Northern Canada, collected by Commander Low, during the Expedition of 1903-1904, together with notes on the Geological Horizons to which they belong.” By Dr. H. M. Ami.

The Secretary of the Section, Mr. Léon Gérin, then presented the following:—

REPORT OF SECTION I.

La section a l'honneur de soumettre le procès-verbal de ses délibérations:—

Présents:— Le président, J. Edmond Roy; le secrétaire, Léon Gérin; Mgr. Bruchési, les honorables MM. Poirier et David, M. l'abbé Auguste Gosselin, MM. Sulte et Errol Bouchette.

Des lettres d'excuse ont été reçues de la part de Mgr Bégin, Mgr Paquet, Sir James LeMoine, et de M. l'abbé Camille Roy.

La section a siégé les 22, 23 et 24 mai 1906.

Conformément à une décision prise par la société Royale, en 1899, à l'effet d'offrir une médaille d'or à un écrivain canadien qui se sera distingué par ses travaux littéraires, la section a résolu d'accorder cette médaille à Laura Conan (Mlle Angers), auteur de *l'Oublié* et autres romans de mœurs canadiennes.

Des diplômes d'honneur sont décernés à M. Lagacé, critique d'art, de Montréal; M. l'abbé Perrier, conférencier, de Montréal; M. Adjutor Rivard, avocat, secrétaire de la société du parler Français, de Québec; et M. l'abbé S. A. Lortie, de la société d'Economie sociale, de Québec.

La section exprime le vœu que les statuts de la société Royale soient traduits en français et imprimés.

Que l'article No 19 du règlement soit modifié de manière à ce que l'assemblée générale ne soit jamais appelée à suspendre ses règlements lorsqu'il s'agira de l'élection d'un membre.

Que les membres de la section aient des réunions mensuelles locales à Québec et à Ottawa, dans le but d'étudier et suivre le mouvement littéraire de la région et de faire rapport à l'assemblée annuelle de la société. A ces réunions régionales, il est désirable que les membres de la section se mettent en rapport avec les sociétés locales.

Que le président, M. le sénateur Poirier, l'abbé Camille Roy, l'hon. M. Chapais et M. Ernest Gagnon soient délégués pour représenter la société à la réunion des Américanistes à Québec, en septembre prochain.

Il a été lu une lettre de sir James LeMoine, dans laquelle il demande, vu son grand âge, d'être mis sur la liste des membres à la retraite. Mais la section est désireuse de garder ce collègue si distingué sur la liste de ses membres actifs.

La section décide que pour l'année académique 1906-7 il n'est pas à propos d'élire de membres additionnels. Il existe maintenant dans la section trois vacances. M. Fréchette a été, à sa demande, mis sur la liste des membres retraités. MM. Bellemare et Richard sont décédés.

L'honorable M. L.-O. David a été prié de représenter la société Royale à l'inauguration de la statue de Crémazie à Montréal; et il a accepté.

Les travaux suivants ont été lus et renvoyés au comité de revision de manuscrits :

Discours présidentiel, par M. J.-Edmond Roy.

Nos trois cloches, poésie par Pamphile LeMay.

Les anciens Canadiens de P. A. Gaspé, par M. l'abbé Camille Roy.

Les successeurs de La Verendrye, par l'hon. M. L. A. Prud'homme.

L'habitant Canadien-français, par Léon Gérin.

L'instruction primaire et le progrès social, par Errol Bouchette.

Inventaire chronologique des livres, brochures, etc., publiés en langue anglaise dans la province de Québec, par N. E. Dionne.

Voyage de l'abbé Holmes d'après sa correspondance, par l'abbé A. Gosselin.

L'habitation de Samos, par M. P. B. Casgrain.

Un Vieil Historien de la Nouvelle France, par l'honorable M. Thomas Chapais.

Le Commerce de France avec le Canada avant 1760, par M. B. Sulte.

Essai sur Charlevoix, par M. J.-Edmond Roy.

Lafontaine et Baldwin, par l'hon. M. L.-O. David.

La République d'Indian Stream, par M. F. J. Audet.

MM. B. Sulte, A. D. DeCelles et l'hon. M. T. Chapais ont été chargés de faire la revision des manuscrits.

Le bureau suivant a été élu pour l'année 1906-7 :

M. l'abbé Camille Roy, président.

L'hon. M. T. Chapais, vice-président.

M. Errol Bouchette, secrétaire.

LÉON GÉRIN.

Secrétaire.

It was then moved by Mr. B. Sulte, seconded by l'abbé Gosselin, and carried:—

Que Mgr J. C. K. Laflamme, l'hon. Pascal Poirier, M. l'abbé Roy, l'hon. Thomas Chapais et M. Ernest Gagnon soient délégués pour représenter la société Royale à la réunion des Américanistes à Québec en septembre prochain.

The committee on nominations reported as follows:—

For President, Dr. Saunders.

For Vice-President, Dr. S. E. Dawson.

For Honorary Secretary, Dr. James Fletcher.

For Honorary Treasurer, Lawrence M. Lambe.

Whereupon the following resolutions were passed unanimously:—

Moved by Dr. J. E. Roy, seconded by Mr. Léon Gérin, and carried:—

That Dr. William Saunders be elected President for the ensuing year.

Moved by Sir Sandford Fleming, seconded by Sir James Grant, and carried:—

That Dr. S. E. Dawson be elected Vice-President for the ensuing year.

Moved by Lt.-Col Denison, seconded by Dr. Girdwood, and carried:—

That Dr. James Fletcher be elected Honorary Secretary for the ensuing year.

Moved by Dr. H. J. Morgan, seconded by Mr. Thos. Macfarlane, and carried:—

That Mr. Lawrence Lambe be elected Honorary Treasurer for the ensuing year.

No further business being brought forward the President then declared the twenty-fifth annual session closed.

After the meeting closed the members attended the reception given at the Dominion Observatory and Experimental Farm by Mrs. Saunders and Mrs. King. The grounds and laboratories of the farm were thrown open for the inspection of visitors by permission of the Director. Dr. King, the Dominion Astronomer, conducted the Fellows over the new Observatory, and explained the complete and beautiful apparatus with which it has been provided by the Government.

EVENING SESSION (Thursday, May 24.)

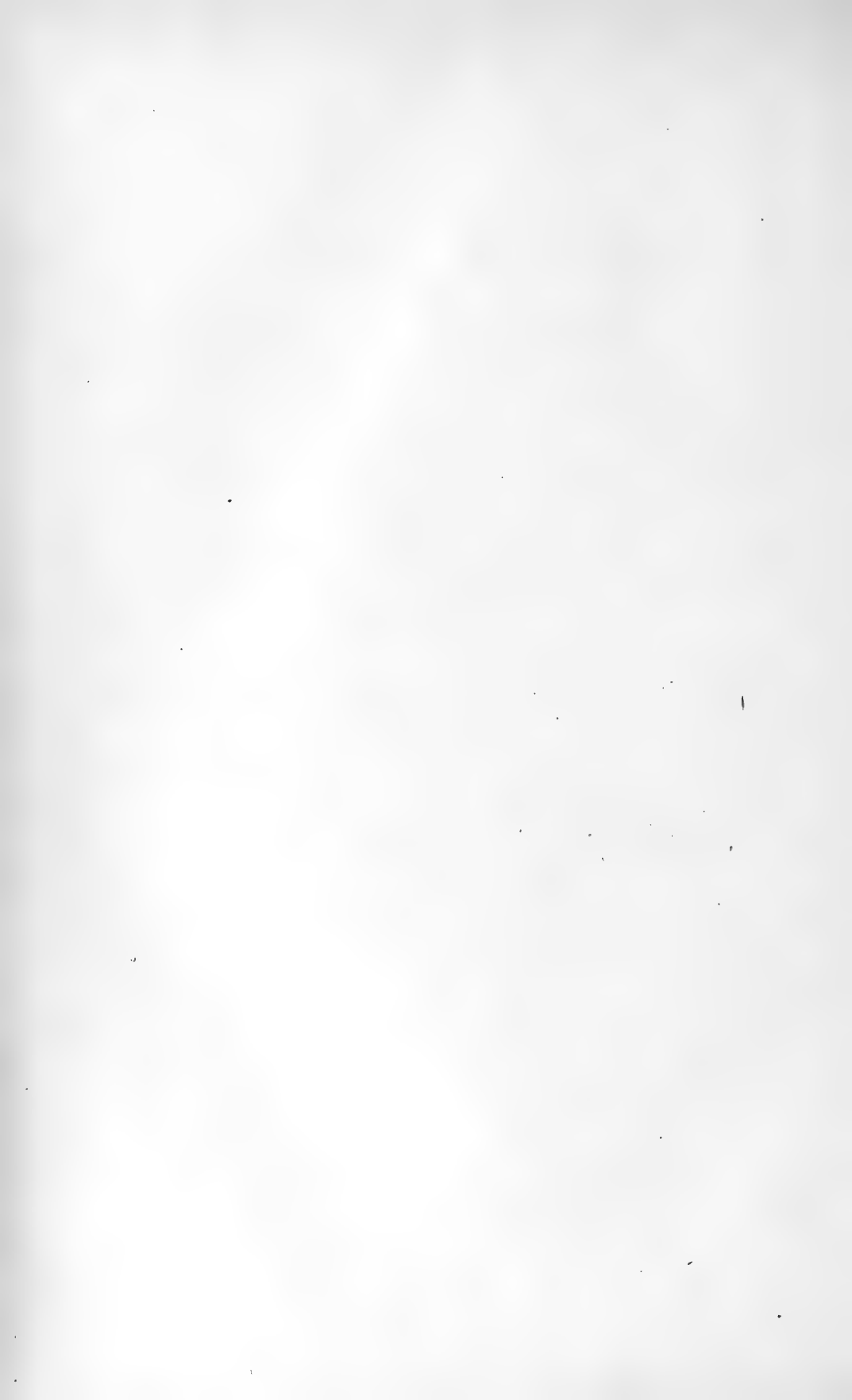
At 8.15 p.m. the Fellows and delegates assembled at the Russell House at a dinner, at which the retiring president, Dr. Alex. Johnson, presided.

APPENDIX A

OUR SEMI JUBILEE AND CANADA

By PROF. ALEXANDER JOHNSON, M.A., LL.D., D.C.L.

President's Address, May 22nd, 1906



PRESIDENT'S ADDRESS

Our Semi-Jubilee has arrived, and it belongs to my office to speak of the Society, its origin, its objects, and its success.

First, however, let me express with a warm heart, although with imperfect words, the thanks which I feel that I owe to the society which has elected me to be its president at such an epoch in its history, the society which is itself representative of all that is highest and best, in the Literature and Science of the Dominion and is in sympathy with and supported by the lovers of knowledge and of intellectual culture, who have their more frequent gatherings for the same objects in the widely scattered local centres of this quarter of the empire.

How did this Society originate? Not from any action of our own. Separation by long distances and other obstacles prevented mutual acquaintance and union in the past. I speak as one who was a University Professor long before the existence of the society.

The Founder, the Duke of Argyll.

But fortunately we had in 1881, as governor-general, a far-seeing statesman, then Marquis of Lorne, who could estimate rightly the future of this country and foresee its needs. Fortunately, too, when initiating the movement, he was able to call to his assistance in organizing the young society a man so wonderfully capable and energetic as the late Sir William Dawson.

The idea was entirely that of the Marquis himself as Sir William tells us in his autobiography. Indeed Sir William says that his own preference would have been for a purely scientific society like the Royal Society of London, but the Marquis had before him the thought of the French Institute also, in which literature has its place; and there is much to be said for his decision.

Literature and Science.

If I may speak as a member of our scientific division and on its behalf, we may acknowledge that, while we are all proud of the wonders science has done for mankind yet, if we compare its efforts for good or evil with the influence of literature, we find that while the amazing productions of science may bulk large before the eye at any one place or time yet a general view brings before us the transcendent powers of literature. The costly guns and equipment of a monster' man-of-war dwarf the small and inexpensive flag that floats above it. But behind

the guns are only the fighting men of the ship while behind the flag are the sentiment and strength of an empire. This conviction, no doubt, prevailed with the founder of our society, although there were some practical considerations in favour of the limitation of the scheme to science, at least at the beginning.

Sir William Dawson.

Sir William accepted the views of the Marquis, and heartily co-operated in laying the foundations of a society with which, as he says himself, he hoped his name would ever be associated, as I associate it to-day. In testimony to the appreciation of his work, he was twice appointed President, a unique honour in the society.

Objects of the Society.

It was intended to be the Parliament of Literature and Science for Canada, where the most eminent representatives from all the provinces could assemble for the promotion of both. It was to be a University for Universities where the teachers of teachers, and the investigators of truth, should themselves get new knowledge, while contributing the results of their researches and gaining fresh stimulus from the spirit of association. It was, in fine, to be the heart of knowledge and research, driving the life-blood through the extremities and making it circulate through the whole of the Dominion.

These were noble objects that the Duke of Argyll set before him. But more than this was evidently meant.

The Two Languages.

Such a society would bring together the leaders of thought and culture in both languages and by mutual acquaintance tend to promote mutual respect and regard. How successful it has been in this, I suppose we can all testify. I for one am greatly sensible how much both of benefit and pleasure I have derived from contact with the eminent men having French for their mother-tongue whom I have met here, some of whom have passed away, but whose names are not forgotten.

It was sound statesmanship, even if we look for nothing higher to create two literary sections, one for each language, as a testimony to the belief in the permanent co-existence of both languages, and so diminish and help to remove a certain nervousness on the subject which is now fading away, if not wholly departed; but which I believe would not

have arisen, if many could have had the same experience as I had some years ago; to my own great astonishment, I admit.

It will be acknowledged that if the whole French-speaking population of Canada could be transferred to England and settled there within five or six hours of London, there would be much greater probability of the absorption of the French language than under present conditions. Well, you will find actually in that position, a people about the same in numbers, with a language and literature which are not English, and with an enthusiasm for their language and literature which is not exceeded anywhere; who have preserved both for more than six hundred years; a people who have great weight in the Imperial Parliament, and who are more than satisfied with their influence in it and in the Empire at large. Who are more loyal to the Empire than the Welsh? I might even say, who more devoted, maintaining it with true Celtic fervour? It is their own. Nevertheless there is a large part of that people who cannot speak a word of English. Books will give you no conception of this fact. You must go and live in Wales for a short time to appreciate the reality.

I spent a month there, near the chief centre for English tourists, and yet I was sometimes obliged to use the language of signs alone to try to convey my requests; with varying results. The only part of a symbolical sentence that was an invariable success was the exhibition of the Queen's profile on silver.

Aid to the Government.

There was a hope also that the Government would sometimes find the advice of the society useful within the society's own field. That the representatives of the people at large would take counsel with the representatives of that portion of the people who live on the hill nearer the sources of knowledge from which issue the descending streams that enrich and beautify the practical life of the community. And this hope has been fulfilled.

Courtesy and Official Action of the Government.

It is an evidence of the success of our Canadian constitution that the Government elected by the people, has shown itself without distinction of party always ready to receive the representations of this society, with courtesy, and while proceeding with deliberative caution, to act with liberality when satisfied.

Tidal and Hydrographic Surveys.

This very day one of your committees has reported two instances under two separate governments, in which surveys have been established for the safety of Canadian navigation on the suggestions of this Society.

Visit of the B.A.A.S. to Winnipeg.

You have also a report before you showing with what quick appreciation the present Prime Minister received a deputation from the Society last year, and how promptly, after inquiry, he agreed to propose to Parliament a handsome grant to enable us to have a visit from the British Association in Winnipeg.

International Geological Congress.

It will not be forgotten that in a previous year a similar request concerning a visit from the International Geological Congress, was received in a similar spirit and with equal liberality. We can only regret that the Congress could not come, and hope for better fortune on a future opportunity, after the visit of the B.A.A.S. to Winnipeg, which according to precedent, may be safely counted on in due course.

Provision for Visits of Associations from other Countries. •

But how are we to make sure of a future opportunity? What everybody desires, everybody may expect his neighbour to get for him; and then every effort becomes a matter of chance; or again, two different desires may present themselves to two persons at the same time and then there may be a clash of efforts. That visits of associations like our own from other countries will be of great value to Canada and are thus very desirable, all feel; but how are we to get them if we have no system? Ought we not to put on some small committee or on the Council, the responsibility of recommending to the society from time to time, at regulated intervals, if possible, invitations for such visits?

Chance and not-chance.

If not they will be left to chance. I speak with knowledge, for if I may be excused for mentioning the fact, it was due to chance that the movements for two meetings of the B.A.A.S. in Canada (out of three altogether), were initiated by the same individual, myself. One being for the meeting in Toronto in 1897, which was started by correspondence with leading men in Toronto immediately after my return from the Edinburgh meeting in 1892. The other for Winnipeg, as the Rev. Dr. Bryce very kindly indicated, when bringing forward the resolution last year in this society; I had been waiting for months previously to make the suggestion to him at the meeting of the society, in connection with what is now the third city in population in Canada. How ably and successfully he has organized the movement we all know. I can there-

fre speak with conviction when I say chance, although the chances were perhaps increased by the fact that I was connected with both the R.S.C. and the B.A.A.S. as chairman of committees of both.

What however is not a matter of chance but is due to the forethought of the Duke of Argyll, and to the corporate character of the society he founded, is, that a member who lived the retired life of a University Professor, sunk fathoms deep in lectures, as most professors were in ante-society days, and very many are now, should have had the opportunity to emerge occasionally, and through the gathering together of his colleagues from all parts of Canada and the backing and encouragement which they gave him, should have been able twice to influence the Parliament to pass such large measures for the safety of our ships on both oceans, and of the lives of our sailors; and twice to initiate the movements for bringing across the Atlantic to Canada one of the greatest scientific associations of the world.

Have we not here plain encouragement to members who from their position see, and dislike to see, Canada lagging behind on any line of national development, and are willing to undertake the laborious and often disheartening task of trying to quicken the action of the people and the government?

Central Position of Canada.

There is an additional and a strong reason for an amendment in our regulations or by-laws so as to make specific allotment of the responsibility I advocate. It is the central position of Canada in the Empire. I have made an estimate of the time and expenses of travelling from London to Australia and New Zealand or vice versa and if any one else will do the same, he will find that they are greater than to South Africa, and so great as to preclude, in general, visits of a body of University Professors to or from those countries. But professors from Australia and New Zealand could get to Winnipeg and back in the limited time at their disposal and, no doubt, they will be invited. Besides, and this is no small advantage, the American Association can, as on former occasions, so choose its place of meeting for the year, that visits may be interchanged to our mutual gain. We may hope therefore for more visits in the future than in the past and ought to make provision accordingly.

Papers in the Transactions.

So far I have spoken only of the corporate action of the society; of what it has been to do as a body. I should have liked, if it were possible, to give some sketch of an analytical classification of the mass of papers that have been published by the members during the 25 years.

But who could do this with such a variety of subjects? A list of the titles; a full index, would be undoubtedly of great value, and would mark the epoch in a notable manner. This, as you will see from the programme for the meeting, has been generously undertaken by the president of last year, M. B. Sulte, and for it we owe him our hearty thanks. But it must always be remembered, that the work of this society, meeting, as it does, only once a year, presents only a small part of the work done by its members. For a view of the whole we must look, not only in publishers' lists, but in the magazines and journals of this and other countries, especially for papers whose prompt publication is necessary. We made a much needed amendment, last year, in our rules so as to secure more speedy publication, which will no doubt increase in future, the number of papers in our Transactions; and to this I would call the attention of members who may not have noticed it.

It would be practical proof of the value of a society of this character to the members severally if we could conveniently collect their evidence, especially that of the senior members, who are able to contrast the past with the present; and submit even a summary. Perhaps it may be obtained in the future. Meanwhile I offer as a contribution my own experience in this and other associations, as of one fully sensible of the contrast between the ante-society days and the present time.

Principle of Verification.

In preparing this matter, the great principle of verification, of which we all know the value for the establishment of truth, whether of hypotheses, or theories, or quotations, or the meaning of words, in science or in literature, was strikingly brought before me, by instances of its neglect. Neglect too, in perhaps the least expected case, that of the labours of Newton, "qui genus humanum ingenio superavit," as the quotation from Lucretius, on his monument at Cambridge says, and the general verdict affirms.

The first two instances that I shall submit, came in my way, quite casually, at the meeting of the American Association, in Montreal, in the same year as that of the foundation of this Society.

The year after Newton's death, a work entitled the "System of the World" and professing to be by him, was published, giving in English, a kind of popular account of his discoveries. Nearly 140 years afterwards, in 1867, doubts of its genuineness were expressed in Knight's English Cyclopædia, but apparently no further inquiry was made. This book had been reprinted and bound up with an English translation of the Principia, giving the impression that it was part of the Principia. A member of the American Association, having discovered in

the book a huge mathematical blunder in calculating the attraction of two spheres, very properly reported his discovery to the mathematical and physical section, and created a very lively discussion.

By good fortune I had both books in my possession, the English "System of the World," dated 1731, and the Latin *Principia* in the standard edition of the present day. This proved that the former was no part of the *Principia*, and the enormity of the blunder settled the question about genuineness raised in the *Encyclopædia*. Newton could not have made it. It was of the same character as that sometimes made by a school boy at an examination, when he calculates that the interest on \$300 for 6 months at 6 per cent is about \$72,000.

I may add as exemplifying that science is independent of nationality, that the standard edition spoken of, was a reprint of the edition published about twelve years after Newton's death, with a commentary, also in Latin, by two Frenchmen, P.P. Le Sueur and Jacquier, priests of the Gallican order of Minims, that it was edited by them at Rome, and dedicated to a French Cardinal, Rohan.

The second instance occurred at the same meeting and was more interesting. For about thirty years previously English text-books on optics had been stating and even lamenting, especially after the invention of the spectroscope, that Newton had never used the slit instead of the round hole for the admission of light on the prism in the formation of the spectrum. I happened to have a copy of Newton's "Opticks" and knew that the statement was wrong. He mentions very particularly the advantages of the slit. But I was afraid to write about the error. For, surely, I thought, there must be many eminent men of science in England who know of it, and if they think it unnecessary to make a correction why should I interfere? It cannot be so common as it appears to be.

The late Dr. Rowland, of Johns Hopkins' University happened to be exhibiting his concave gratings with their beautiful effects in the resolution of the spectrum, when a prominent scientific man, after prolonged inspection, expressed the usual regret about Newton. After that, I immediately wrote a short note to a weekly scientific magazine; but with no result apparently. I subsequently repeated Newton's experiments in Newton's manner exactly, and submitted a paper thereon to this Society showing that it was absolutely impossible to avoid seeing the dark lines, although Newton makes no mention of them. In books published since that time the statement has been given correctly.

Why Newton didn't see the lines may be explained either by the fact that he trusted to an assistant of whom he speaks or that the quality of his glass was bad, possibly obstructing somewhat the passage of the light,

and scattering it internally. It would appear also that for about 70 years after Newton's death nobody repeated his experiments or else the glass was bad, and the lines were not discovered until Wollaston's time. His paper was published in the Philosophical Transactions in 1802.

Although quotations from the "Opticks" are not very uncommon it would appear from the next instance I shall produce that the book is difficult of access. It would be a benefit to science if some wealthy American University were to reprint so famous a work, a model of clearness and accurate experiment.

Newton and Herbert Spencer.

This third instance occurred a few years earlier, when Herbert Spencer was led to put his opinions directly in opposition to those of Newton, in Natural Philosophy itself, through a mistake about the meaning of a word in the Principia, which would have been avoided had the "Opticks" been consulted. Newton calls the laws of motion "axioms"; Spencer, evidently having in his mind the ordinary use of the word axiom in the modern editions of Euclid, as meaning a self-evident proposition, insisted that Newton employed it in this sense.

An inspiring discussion in print followed which ended by Spencer's acknowledging that Newton attached a different meaning to the word. The proof was obtained from Newton's letters, and in the whole discussion no reference was made to the "Opticks." Yet a glance at the book would have ended the debate. Newton begins it with definitions and axioms. The "axioms" are the Laws of "Reflexion and Refraction," and these, as some school boys know, are established by experiment solely. Spencer says that Newton "gives the word axiom a sense widely unlike the sense in which it is usually accepted," implying perhaps some censure on Newton. If "usually" means usually at the present day, Spencer is correct. But is it possible he can have forgotten that a word may change its meaning with the lapse of time? A very brief inquiry would have shown that Newton used the word accurately both in the "Opticks" and the "Principia." No deeper research is required than turning over the leaves of Liddell and Scott to find that it was employed by Aristotle to signify "that which is assumed as a basis of demonstration;" for "assumption" in short, or "postulate;" the root idea being that of worthiness, something worthy of acceptance without disputation. Nor is Euclid responsible for the word, since he didn't use it and is thus doubly free from the charge of calling his principle about parallel lines "self-evident."

The question arose in a controversy between Herbert Spencer and Prof. Tait. The latter in his Thermodynamics asserts that Natural

Philosophy is an experimental and not an intuitive science. "No *à priori* reasoning can conduct us demonstratively to a single physical truth."

"I hold, on the contrary," says Spencer "that as there are *à priori* mathematical truths the consciousness of which results, not from our individual experiences, but from the organized and inherited effects of ancestral experiences, received throughout an immeasurable past; so there are *à priori* physical truths, our consciousness of which has a like origin. I have endeavoured to show that Prof. Tait himself by saying of physical axioms that the appropriately cultivated intelligence sees at once their necessary truth, tacitly classes them with mathematical axioms of which this self-evidence is also the recognized character. Further I have contended that the Laws of Motion are *à priori* truths of this kind; are enunciated by Newton as such"—Spencer then goes on to quote Tait's reason for asserting that the Laws of Motion are not to be accepted as valid *à priori*. "The reason is that as the properties of matter might have been such as to render a totally different set of laws axiomatic, these laws must be considered as resting on observation and experiment, and not on intuitive perception." This is also the opinion of Newton as expressed in his letters. If Herbert Spencer had ever lectured to a class of students on the Second Law of Motion he might have been tempted to explain their want of intuitive perception of its *a priori* truth by a limitation of the "immeasurable past" in their "ancestral experiences," and put the origin of man as recent.

The position of Spencer in the disputation was like that of an army which while fighting the enemy in front is unexpectedly assailed in the flank by a force called in as an auxiliary. But Spencer did not quail. He faced the new foe with undaunted courage, supported probably by the conviction that while his adversary seemed to be on his own territory of Physics, he was on the very verge, if he had not actually crossed the boundary line of Metaphysics, a department which borders on all the Physical and Natural sciences, and appears to have to some students in these departments the fascinating advantage for polemic purposes of a general absence of axioms (i.e., of propositions universally admitted). Hence combatants with differing opinions can each choose his own axioms i.e assumptions, to support his own views, and confound adversaries. Much logomachy may thus leave general satisfaction. No one is confuted.

Alchemy.

Passing on from a consideration of the uses of the Society to recent progress in science, in which Canada like all the rest of the world, is interested; and more perhaps, than most of it, in one division of the domain of Physics, we shall come casually on other rather surprising in-

stances of this neglect of verification. We meet also an exemplification of the epigram that it is the unexpected that happens.

Who could have expected that this advance would have brought us again to the old and apparently dead question of alchemy? The name and the subject had been both handed over long ago to the romancists, as a legitimate province in which they might work their magic, by introducing Hermes Trismegistus, and the Philosopher's Stone, and the "Adepts", as for example the "Adept" depicted by Scott in "Kenilworth."

Sixteen centuries back, the Roman Emperor Diocletian commanded that all books on Alchemy should be burnt; but he did not thereby kill out man's greed for gain, or spirit of inquiry. Unbroken ill-success for many ages, however, produced the natural effect of despair. The historian Gibbon commenting on the fact says, "Philosophy with the aid of experience, has at length banished the study." In this he expressed the general opinion that prevailed for more than a century.

A similar opinion was otherwise indicated by a comparatively recent writer, when, referring to the famous Friar Bacon, who lived nearly seven centuries from the present time, he said "Notwithstanding the great learning and scientific acquirements of Bacon he was deeply imbued with the mystery of Alchemy: this is the more remarkable, because he exposes the absurdity of believing in magic, necromancy or charms." The writer classes alchemy among the "absurdities." The reputation of the celebrated friar will, however, be increased, to-day, instead of lessened by his differing opinion.

The prevailing opinion was not universal. One of the problems of the Alchemists was the transmutation of the baser metals into gold, and we know that both Boyle and Newton believed that this was attainable.

Boyle made experiments, one of which by its apparent approximation to success so alarmed Newton that he advised concealment. This may have been because of a statute of Henry IV, which forbade "the multiplying of gold and silver." Certain it is that not long before his death Boyle procured the repeal of the statute in order to remove an obstacle from the path of others. Newton himself continued his experiments to a late period of his life. When he was a young man, about 26 years of age, he wrote to a young friend of his own, who was going to the Continent, and asked him particularly to make observations on mines and mining, and "the extracting of metals or minerals out of their ores," to learn if there were any transmutation out of one species into another, such transmutations, he adds, being "the most luciferous and many times luciferous experiments, too, in philosophy."

Dr. George Wilson, brother of the late Sir Daniel Wilson, of Toronto University, in his essay on Boyle, published about the middle of the last century, remarks that there is no *à priori* objection to the possibility of transmutation as there is to the possibility of a self-sustaining perpetual motion. "It may be realized any day" he says.

It has been partially realized to-day, to the extent, that is, that nature has been discovered working transformations of some of the chemical elements, and science is now eagerly inquiring to how many elements the process extends. But no one has yet learned to imitate the powers of nature in this respect.

Greek Atomic Theory.

As consequences of these discoveries, two erroneous opinions have got abroad; one, of a vague popular character, that a fatal defect has been found in the basis of chemistry; the other, more definite, that the old Atomic Theory has been disestablished, and the death-knell of the Atom rung. A slight sketch may show that these opinions have no sufficient foundation.

It may occur to any one who has noticed a stone ground to powder or a drop of water subdivided to the cover of a pin-point, to inquire how far the subdivision can be carried. The question is not limited to what can be seen by the naked eye, or detected by the most powerful microscope but extends beyond the region of sight to what can be inferred by sound reasoning from careful observations.

It is, as Newton put it, and as Lord Kelvin re-states it, not a question whether we can imagine the subdivision to go on for ever, but a practical question, whether, using the forces of Nature at our command, we come eventually to an end of subdivision, and have something indivisible, an atom. No one has ever seen an atom, and from the nature of light itself, there is no hope that we shall ever invent an instrument which will enable us to see it. Still we may safely infer the existence of atoms even though a procession of ciphers headed by unity, giving the number that would extend over the twenty-fifth part of an inch, should not help the imagination much to picture their smallness.

Sir John Herschel asserts that the idea of the atom is an absolute necessity of the "thinking mind, and is of all ages and nations."

Whewell in his "History of Scientific Ideas" says:—"The doctrine that matter consists of minute, simple, indivisible, indestructible particles as its ultimate elements has been current in all ages and all countries wherever the tendency of man to wide and subtle speculation has been active."

The progress of modern science has tended to produce a strong conviction of the truth of the theory.—The phenomena of diffusion in liquids and gases, for example, tend to show that they not only consist of particles, but that these particles are in constant motion. As an example in solids we have that remarkable experiment of Roberts-Austen, in which a cylinder of lead was placed on top of a cylinder of gold, and left for a considerable time in a warm chamber; when taken and examined gold was found diffused throughout the lead, particles of this the heavier metal having risen upwards as if they had wings.

It is certain that the theory, which long preceded the dawn of experimental science, came to modern Europe from Ancient Greece and it has been traced even to India. Strabo who lived in the reigns of the Roman emperors, Augustus and Tiberius, says that its author was Mochus or Moschus, of whom he speaks vaguely as more ancient than the Trojan war. This would make the Greek Theory not less than three thousand years old and will mark it off from Dalton's Atomic Theory which came into being only a century ago.

We have more definite statements about Democritus as author of the Atomic Theory and before him of Leucippus, although the writings of neither survive. Lucretius, the contemporary of Cicero, expounded it in his great poem "*De Rerum Naturâ*"—Thus it was transmitted to modern times, and became familiar. Newton gives it a compact shape. Dalton had firm faith in it.

Dalton's Atomic Theory.

From the emphasis with which Dr. George Wilson writes in his account of Dalton's "*Life and Discoveries*," it would almost seem as if he had foreseen the mistakes made about Dalton's Atomic Theory to-day. He says, and re-iterates, that Dalton was an Atomist before he was a Chemist—that he joined the Greek Atomic Theory, which he found in existence, with the Chemical Laws of combining proportions, but that the laws rested on a perfectly independent basis of experiment—that it was unnecessary to concede to Dalton's atoms the attribute of indivisibility, and that Dalton's contemporaries, Davy, Wollaston, Berzelius, declined to employ the word atom, because it assumed indivisibility, and that they substituted other words. In short, that the Greek Atomic Theory and the Chemical Laws are independent one of the other. That if the link forged by Dalton between the Greek Theory and the Experimental Laws be broken, the Experimental Laws are absolutely secure, while the Theory must stand or fall by its own merits.

This expresses exactly the position to-day. The link has been broken. The existence of bodies much smaller than those presented to

us by Dalton as ultimate particles, as atoms, has been proved by Prof. J. J. Thomson of Cambridge; and the so-called atoms themselves are found to be complex systems masquerading as simple bodies; and are indeed gigantic impostors compared with their little successors.

Newton and Wilson.

But this does not detract from the genius and merit of Dalton, for which Wilson expresses great admiration, and is so far carried away that he does, unwittingly, a great injustice to Newton.

In contrasting the earlier views of the Atomic Theory with those of Dalton he takes Newton as representative, and quotes from the fourth edition of his "Opticks" as follows:—"All things considered" says Newton, "it seems probable that God in the beginning, formed matter in solid, "massy, hard, impenetrable, movable particles of such sizes, figures, "and with such other properties, and in such proportion to space, as "most conduced to the end for which he formed them; and that these "primitive particles, being solids, are incomparably harder than any "porous bodies compounded of them, even so very hard as never to wear "or break to pieces, no ordinary power being able to divide what God "made one in the first creation."

On this extract Wilson remarks:—

"Newton, it will be observed, says nothing concerning the weight of "his primitive particles."—"It is here that Dalton introducing the "question of weight, leaves Newton behind, and takes not a step, but "a stride, in advance of all previous speculators on atomics."

Wilson has overlooked the word "massy," i.e. having mass, chosen carefully by Newton, and a very much better word in one respect than "weighty" or any other referring to weight, for if these "primitive particles" were removed to the Sun or any of the heavenly bodies or even to different parts of the Earth their weight would change, while their mass would be unchanged. Newton had proved by experiments that at a given place mass was proportional to weight (a fact ignored by many approved text-books on Mechanics in Wilson's time). That the omission by Newton of weight from the essential properties of particles was deliberate is seen by reference to the "*Regulæ Philosophandi*" where he states, repeats, and re-iterates the five properties, extension, hardness, impenetrability, mobility, and "*vis inertię*;" subsequently saying that he by no means affirms ("*minime affirmo*") that gravity is essential to bodies, but "*vis inertię*" or "*vis insita*" as it is elsewhere called, is immutable. This "*vis insita*" he states in the Definitions is always proportional to the mass. It may also be noted that Newton does not use the

word "atoms" but speaks of the smallest parts ("partes minimas"). He also employs the term undivided, not indivisible—"partes indivisae."

Wilson appears to have regarded the word "massy" in the "Opticks" as redundant, yet if it be omitted, we have only four essential properties instead of the five given in the "Principia."

Dalton's genius was as quickly recognized on the Continent as in England, perhaps even more quickly. His experience on a visit to France presents another instance of noble generosity among lovers of Science. He was so warmly welcomed by the members of the French Institute, and so much more honoured than among his own countryman that on his return home, although not given to express his feelings, he said, "If any Englishman has reason to be proud of his reception in France, I am that one."

Present View of the Atom. Transformation of Matter.

The latest advance in the study of the constitution of matter is that the Daltonian atom is of a very complex nature, a kind of infinitesimal planetary system in itself, which in the case of some, at least, of the chemical elements, seventy or so in number, is breaking up by its own internal energy, projecting a number of particles, and, after a series of steps, exhibiting a veritable transformation of one element into another. In this manner uranium is the parent of radium, and radium is the parent of helium. Further changes are the subject of eager investigation which is now in rapid and breathless progress.

Many in Canada are engaged in the research, which had its origin a few years ago in the investigations that followed the discovery of the X rays, which are now so familiar to us all, and so startled us at first in exhibiting the skeleton of the hand of a living man.

Ten years ago Henri Becquerel of Paris discovered that uranium could produce in the dark, what, for want of a better word may be called photographic effects similar to those of the X-rays; the explanation being that uranium is constantly sending off invisible radiations, i.e. streams of particles, whose action is thus made visible.

M. and Mme. Curie, undertaking a patient examination of all the chemical elements in search for any with similar properties discovered radium in 1898.

The extraordinary phenomena exhibited by this and certain other elements, were linked together by the theory already given which had its birth in Canada and has been accepted generally throughout the scientific world. Its authors were Dr. Rutherford and Mr. Soddy. Canada unfortunately has been unable to retain Mr. Soddy, but after going to England his work in the same direction bore good fruit; for

he and Sir William Ramsay co-operating were able to verify a prediction of Dr. Rutherford's. They saw the spectrum of helium grow out of the spectrum of the emanation of radium, i.e., an actual transformation of matter took place before their eyes. Dr. Rutherford had based his prediction on the fact that helium is found on the earth only in connection with elements that emit the radiations which have been here spoken of.

Other transformations have been since observed. More surprising, perhaps, because not anticipated, even in speculation, was the discovery, three years ago by M. Curie and M. Laborde, of the enormous amount of energy latent in the atom of radium and released by its disintegration; an amount sufficient to reconcile the divergent views of Physics and Geology on questions connected with the Sun's heat.

The accidental death of M. Curie a month ago in Paris must be a cause of regret to lovers of Science, while the severance of the remarkable partnership in heart and mind of those who by their scientific eminence, whether separately or in co-operation, have become familiar to all as "the two Curies" and have been known in ordinary life as M. and Mme. Curie must touch all hearts.

Comparison of Recent Advances in Physical Science.

In briefly noting the advance in one department of Physical Science since the foundation of the Society, I will take for a standard of comparison, Prof. Tait's work published in 1876 on the then "Recent Advances in Physical Science."

It had long been established, by means of the balance, that in spite of appearances, as in the case of a burning candle, it was impossible to destroy matter, just as it was impossible to create it. This principle of indestructibility is often called the "Conservation of Matter."

If we define "energy" as the capacity of doing work—such work as engineers delight in—and measure it, the companion principle of the "Conservation of Energy" asserts that it is impossible to increase or diminish the quantity of energy in the Universe. This principle was established about the middle of the last century.

But while the quantity of energy cannot be increased or diminished, the form is readily changed as when a water-fall is used to drive street-cars, or to supply electric light or heat. The Transformation of Energy was fully accepted along with its Conservation. To this there was however at the time of Tait's book no companion principle for matter, or as Tait puts it "The laws of energy differ from those of matter in "one most important respect, so far at least as we yet know by experi-

"ment. Matter cannot so far as we know be transmuted from one kind to another, though in some cases it assumes what is called an "allotropic form. The great characteristic of energy, on the other hand, is that, in general, we can readily transform it, (in fact it is "of use solely because it can be transformed), but in all its transformations the quantity remains precisely the same."

It will be observed that Tait is very cautious in his wording, "So far as we yet know," he says. His caution is justified. For here a distinct advance has been made in proving the transformation of some kinds of matter, and a vast field of inquiry has been opened.

Dissipation of Matter.

The inquiry itself suggests another companion principle whose correlation may be indicated by the term Dissipation of Matter (a term I have not yet come across), corresponding to what Lord Kelvin called the "Dissipation of Energy." This latter principle points out that "every time a transformation takes place, there is always a tendency to pass, at least in part, from a higher or more easily transformable to a lower or less easily transformable form.

"Thus the energy of the universe, is on the whole, constantly "passing from higher to lower forms." The low form to which it seems to tend being "that of uniformly diffused heat."

A quotation farther on, will again offer us a comparison of "then" and "now." "Thus," he says, "so far as we can yet determine in "the far distant future of the universe, the quantities of matter and "energy will remain absolutely as they now are." ("Then" and "Now" agree in this; they differ in the next clause, viz.)—"the matter unchanged alike in quantity and quality;—the energy also unchanged in quantity, but entirely transformed in quality to the low form of uniformly diffused heat."

Now the recent discoveries show that the transformations of matter which are going on in nature, are so far as observed, from "higher to lower forms" to use Tait's terms.

If then the principle, should, by a process of exhaustion, be proved to be general and the lowest form be ascertained, we shall have the companion principle and shall be able to say that in the far distant future of the universe not only will all energy be reduced to uniformly diffused heat but all matter to its lowest form.

This further permits the possibility of the supposition that some of the nebulae visible to us, instead of being the beginnings of new suns or planets, may, in fact, be the wreckage of worlds or world-systems like our own floating in the illimitable ocean of space.

When observers, then, are watching the projection of streams of particles from the matter around us, they may be really watching the wasting away of our world. This reminds me of an account I have read of a sailor in an old and leaky troop-ship on a long voyage who used to go down to the hold, and watching the tiny jets of water spouting in through the minute holes in the thin worn sides, try to estimate how long the vessel would last.

If this Trilogy of principles, Conservation, Transformation, Dissipation, should be finally established for Matter, as they have been established for Energy, the further question would arise whether, as the energy we speak of is always associated with matter, the expressions for them could not be united in one simple form.

Tait referring to the Dissipation of Energy, proceeds further to say "as it alone is able to lead us—to the necessary future of the universe" i.e., if physical laws for ever remain unchanged, so it enables us distinctly to say, that the present order of things has not been evolved "through infinite past time by the agency of laws now at work, but "must have had a distinctive beginning, a state beyond which we are "utterly unable to penetrate, a state in fact that must have been produced by other than the now visibly acting Causes."

Cicero, Herschel, Clerk-Maxwell, on Atoms.

This leads us to an aspect of the theory of atoms which can hardly be passed over.

Cicero in his "De Natura Deorum," Bk. I, represents Cotta, the Academic, speaking of the "absurdities in which Democritus, or before him Leucippus, used to indulge, saying that there are certain light corpuscles, some smooth, some round, some square, some crooked and bent as bows, which by a fortuitous concourse made heaven and earth, without the influence of any natural power." In the second book Balbus, the Stoic says, that he who could believe in the action of this fortuitous concourse, might believe as well that a number of metal letters could by being thrown to the ground, compose a history, e.g. the Annals of Ennius.

Sir John Herschel, in his discourse on Natural Philosophy, with the resources of modern science at his command, puts this in another light, and his argument is not affected by recent discoveries.

"The discoveries of modern chemistry," he says, "have gone far to "establish the truth of an opinion entertained by some of the ancients, "that the universe consists of distinct, separate, indivisible atoms or "individual things, so minute as to escape our senses, except when "united by millions, and by this aggregation making up bodies of even

“the smallest visible bulk; and we have the strongest evidence that although there exist great and essential differences in individuals among these atoms they may yet be arranged in a very limited number of groups and classes, all the individuals of each of which are, to all intents and purposes, exactly alike in all their properties.

“Now when we see a great number of things precisely alike, we do not believe this similarity to have originated except from a common principle independent of them, and that we recognize this likeness chiefly by the identity of their deportment under similar circumstances strengthens rather than weakens the conclusion.

“A line of spinning jennies, or a regiment of soldiers dressed exactly alike, and going through precisely the same evolutions, gives us no idea of independent existence, we must see them act out of concert, before we can believe them to have independent wills and properties not impressed on them from without. And this conclusion which would be strong even were only two individuals precisely alike in all respects, and for ever, acquires irresistible force when their number is multiplied beyond the power of imagination to conceive. If we mistake not, then, the discoveries alluded to, destroy the idea of an eternal self-existent-matter, by giving to each of its atoms, the essential characters, at once, of a manufactured article, and a subordinate agent.”

It will be another illustration of Herschel's argument if we suppose that the minute-hand of every clock on a line of railway from the Atlantic to the Pacific always points to the same minute at the same moment, for then we know that there must be a controlling clock producing this effect by an electric current, and behind this controlling clock a controlling mind.

If instead of hundreds of clocks, we knew that there were countless millions of millions of clocks throughout the universe beating together, the argument would be the stronger.

Now although we have not clocks, the vibrations of whose pendulums are kept in unison, we have vibrating bodies in numbers transcending our power of imagination, which vibrate in exactly the same time throughout the universe. It is Clerk-Maxwell's illustration. We know by the spectroscope, that chemical elements which may be examined in this room, and which exist over all the earth, are to be found also in the Sun and in the most distant stars, stars so distant that news from them flying with the velocity of light, takes ages of ages to reach us, innumerable stars, at immeasurable distances in all directions, above, below, around us; yet in all these heavenly bodies the countless molecules of the element hydrogen, make their quick vibrations in exactly the same period as those on earth, with a perfection of exactitude that no clock of man's construction can approach.

Haeckel.

Contrast with this, the views put forth in a book entitled: "The Riddle of the Universe," by the eminent German biologist, Professor Haeckel, a translation of which has been recently published and has, at present, a wide circulation. In it he gravely offers us, the hypothesis that every atom has in itself the rudiments of life and mind. Is this a relief to the strain of mystery? Sometimes, no doubt, obscurity is relieved by a flash of darkness, yet we are not grateful. As a comment I shall simply quote an extract from the Presidential Address of Sir George Stokes to the British Association.

Sir George Stokes.

"When from the phenomena of life we pass to those of mind, we enter a region still more profoundly mysterious. Science can be expected to do but little to aid us here, since the instrument of research is itself the object of investigation. It can but enlighten us as to the depth of our ignorance and lead us to look to a higher aid for that which most concerns our well-being."

Haeckel versus Newton.

I should hardly have alluded to Haeckel had it not been that through unpardonable want of care, he is led to make a charge against Newton which is the very reverse of the truth. His object is to disparage Newton's intellectual capacity, Newton's opinions being diametrically opposed to his own. Mere railing at an advocate is not confutation of his arguments, and is sometimes a confession of defeat. We may have here a touchstone of Haeckel's qualifications as a guide. He cannot justly complain if the same kind of test is applied to himself which he tries to apply to Newton.

If a man gives dogmatic opinions on colours, who is proved by an easy test, to be colour blind, he will not be taken as pilot for a steamship. If a diviner or seer finds himself unexpectedly put in gaol for breach of the laws, a loss of reputation for his prophecies may be expected. If a man adopts without verification an hypothesis readily proved to be false, and on that as an axiom illogically builds other hypotheses to the damage of an opponent's reputation, want of confidence in his capacity as a theory-builder is *à priori* justifiable.

It is in this way that Professor Haeckel has treated Newton, whose great fame he admits. On page 217 of the recently published New York edition, he writes:—

"Newton had the immortal merit of establishing the law of gravitation and embodying it in an indisputable mathematical formula.—"

"Action at a distance without a medium, which Newton deduced from his law of gravitation, and which became one of the most serious and most dangerous dogmas of later physics, does not afford the slightest explanation of the causes of attraction; indeed it long obstructed our way to the real discovery of them. I cannot but suspect that his speculations on this mysterious action at a distance, contributed not a little to the leading of the great English mathematician into the obscure labyrinth of mystic dreams and theistic superstition in which he passed the last thirty-four years of his life."

"Mystic dreams" and "theistic superstition" is Haeckel's answer to Newton's noble hymn to the Creator at the close of the immortal "*Principia*."

Compare with this Newton's expression of his views in a letter to Bentley, quoted with approval by Faraday, and again, by Sir George Stokes. The fiery indignation which is felt in Newton's words, even after the lapse of two centuries would have burnt itself into the memory of any man who had taken care enough to consult Newton himself for Newton's own thoughts instead of taking, without verification, any version presented in a passing publication.

These are his words:—

"That gravity should be innate, inherent, and essential to matter so that one body may act on another at a distance through a vacuum without the mediation of anything else, by and through which their action and force may be conveyed from one to another, is to me so great an absurdity that I believe no man who has in philosophical matters a competent faculty of thinking, can ever fall into it."

Indian Atomic Theory.

It has been asserted that the atomic theory really had its origin in India, and Democritus, who inherited great wealth from his father is said to have travelled to India, so that his views on atoms may have been modified there.

Of this Indian atomic theory Max Müller gives an account when writing of the Six Philosophical Systems of India. The distinguishing feature of one of these systems was the Atomic Theory—which maintains that there must be smallest particles admitting no further analysis—that these smallest and invisible particles are eternal in themselves, but non-eternal as aggregates—that as aggregates again, they may be organized or inorganic. The atoms are supposed first to form an aggregate of two, then of three double atoms, then of four triple atoms, etc. While single atoms are indestructible, composite atoms are, by their very nature, liable to decomposition, and in that sense to destruction.

The theory even made an estimate of the size of the atom, as being about one-sixth of that of the notes that dance in a sunbeam.

This recalls by the error of the scale, an early Greek estimate of the size of the sun as being about that of the Peloponnesus.

The Indian system of philosophy which advocates the atomic theory differs, *toto cælo*, from that of Democritus, expounded by Lucretius, in this respect, that it offers proofs of the existence of God, and of His omnipotence and omniscience, while the other is atheistic.

Origin of the Name of Canada.

Their direct opposition on this point has given rise in my mind to an interesting historical question, which I hope will prove interesting also to the literary division of our Society, to whom I propose to hand it over for examination, viz., was this Indian atomic theory along with the name of its author known in Europe at the time when the first adventurers were exploring the American continent, the time of the revival of learning. If so, we may have the solution of a problem which has been the cause of much dispute, namely the origin of the name given to a small district in America, concerning which almost the only point of agreement is, that it is Indian. The name has been extended since.

There might be a similar question concerning Pocahontas County in Virginia, if every one did not know the love story of Pocahontas. Few would recognize the name of a philosopher, if similarly applied.

But among the scholars of those days the works of Lucretius would be well known for the beauty of his poetry, and, to use the term chosen by George Henry Lewes, the "offensive" character of his opinions; and correspondingly great would be their satisfaction in finding an older authority on atoms who strongly maintained the doctrine of a Supreme Intelligent Ruler of the Universe.

Now, remembering that Columbus and the early explorers, for many years after him, believed that they had actually reached India, (a name that in those days covered a large part of China as well as what we now call India): remembering also the fervid religious zeal by which many of these explorers were animated, is there anything impossible in the supposition that, hearing of this Indian philosopher, and believing they had reached his country, they should give his name to some part of it? The name of the Indian philosopher was Canada.

Canada spelt with a C or a K, as in many Indian words and names, e.g., Cabul, Candahar, or English words as Kathode, Katherine, Kalendar, or America itself, which in some European languages is spelt with a K. Canada exactly as we have it on our post-cards, requiring no twisting or hacking of the stem to get the familiar form.

In submitting this hypothesis for verification I may say that I have gone no farther myself, than noting that the first Greek edition, the "*editio princeps*" of the classical work of Arrian, the Roman prefect of Cappadocia, on India, was printed in the very year in which Jacques Cartier first ascended the St. Lawrence. This may be a mere coincidence, but it seems to encourage investigation. A Latin translation had been published not long before. Every source of information about India was of course, keenly scrutinized in those days, and as Arrian was also a celebrated writer on philosophy (the Stoic philosophy) the association of ideas even if there were no other cause, would direct attention to Indian philosophy.

The suggested inquiry may be limited at first to the question whether a knowledge of the name of the Indian philosopher and of his philosophy did exist or could have existed in Europe (more especially in France), at the beginning of the 16th century.

It might be impossible to trace the course by which it travelled from India; just as we are unable to recover the history of the great debt which science owes to India in the invention of what are called the Arabic numerals, with their wonderful superiority to the Greek and Roman characters in their facilities for calculation. Yet we are sure that the knowledge percolated through from India, whether by merchants, or travellers, or writings. The shape of the figures themselves is a testimony, from the resemblance they bear to the initial letters of the corresponding Sanskrit names for the numbers.

New light will be welcomed. Only two derivations, so far as I know, have hitherto been in vogue; the first from an original signifying "nothing there"—which is disrespectful to the country—the other from an Indian word meaning "village," which is disrespectful to the inventive faculties of the discoverers. Neither has been accepted with favour, and both are now, in effect, buried in polite oblivion. The field is, therefore, open for fresh attempts.¹

Whatever be the outcome of the inquiry, it is certain that when we look on a map of the world, we find written broad across the forehead of America, the name of an Indian philosopher, the reputed author, and

¹ The suggestion that the name "Canada" might possibly, like the term "Indian" have been imported from India through Europe, has brought out an additional example of the value of the personal meetings in societies like the R. S. C. The impression on my mind concerning the various derivations proposed, given above, was derived from such books as those of Archbishop Trench, Isaac Taylor, etc. At the meeting, after the address, my attention was directed to the new and attractive work of Dr. S. E. Dawson, "The Saint Lawrence," published only last year, in which the native origin of the name is advocated.

undoubted teacher of the Atomic Theory, a man who in far distant and dark ages, reasoned out the belief in an Omnipotent and Omniscient God: and held the harmony of science and religion; a position maintained to this day, by our greatest men of science, not only by Newton, but by such men as Lord Kelvin, Sir John Herschel and Sir George Stokes, Maxwell and Faraday,— the name of Canada.

APPENDIX B

ACT OF INCORPORATION

ACT OF INCORPORATION.

46 VICTORIA, CHAP. 46.

An Act to Incorporate the Royal Society of Canada.

[Assented to 25th May, 1883.]

WHEREAS the persons hereinafter mentioned have, by their petition, represented that a Society called, with the sanction of Her Most Gracious Majesty the Queen, "The Royal Society of Canada," has been founded in Canada by His Excellency the Right Honourable the Marquis of Lorne, Governor-General of Canada; that the said Society has been maintained for some months by the petitioners and others, and that the objects of the said Society are:—first, to encourage studies and investigations in literature and science; secondly, to publish transactions annually or semi-annually, containing the minutes of proceedings at meetings, records of the work performed, original papers and memoirs of merit, and such other documents as may be deemed worthy of publication; thirdly, to offer prizes or other inducements for valuable papers on subjects relating to Canada and to aid researches already begun and carried so far as to render their ultimate value probable; fourthly, to assist in the collection of specimens with a view to the formation of a Canadian Museum of archives, ethnology, archæology and natural history: and whereas the said petitioners have prayed that, for the better attainment of the said objects, the Society may be incorporated by Act of the Parliament of Canada, and it is expedient to grant the prayer of the said petition: Therefore Her Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. J. W. Dawson, C.M.G., LL.D., F.R.S., President; the Honourable P. J. O. Chauveau, LL.D., Docteur ès Lettres, Vice-President; J. M. LeMoine, Esquire, Daniel Wilson, LL.D., F.R.S.E., T. Sterry Hunt, LL.D., F.R.S., A. R. C. Selwyn, LL.D., F.R.S., Presidents of Sections; Faucher de St. Maurice, Esquire, Charles Carpmæl, M.A., George Lawson, Ph.D., LL.D., Vice-Presidents of Sections; J. G. Bourinot, F.S.S., Honorary Secretary; J. A. Grant, M.D., F.G.S., Honorary Treasurer; Goldwin Smith, D.C.L., the Reverend Abbé Bégin, D.D., the Reverend Abbé Bois, Napoleon Bourassa, Esquire, the Reverend Abbé Casgrain, Docteur ès Lettres, Paul DeCazes, Esquire, Oscar Dunn, Esquire, the Honourable Hector Fabre, Louis H. Fréchette, LL.D., Napoleon LeGendre, Esquire, Pamphile Lemay, Esquire, the Honourable F. G. Marchand, Joseph Marmette, Esquire, the Honourable Mr. Justice Routhier, Docteur ès Lettres, Benjamin Sulte, Esquire, the Reverend Abbé Tanguay, Joseph Tassé, Esquire, the Reverend Abbé

Verreau, Docteur ès Lettres, R. Maurice Bucke, M.D., the Reverend Æneas McDonell Dawson, Lieutenant-Colonel G. T. Denison, B.C.L., the Very Reverend G. M. Grant, D.D., William Kirby, Esquire, John L'Espérance, Esquire, Charles Lindsey, Esquire, the Reverend W. Lyall, LL.D., George Murray, B.A., the Reverend J. Clark Murray, LL.D., Evan McColl, Esquire, John Reade, Esquire, Charles Sangster, Esquire, George Stewart (the younger), Esquire, Alpheus Todd, C.M.G., LL.D., J. Watson, M.A., LL.D., G. Paxton Young, M.A., C. Bailargé, C.E., Herbert A. Bayne, Esquire, E. J. Chapman, Ph.D., LL.D., J. B. Cherriman, M.A., E. Deville, C.E., N. F. Dupuis, M.A., F.R.S.E., Sandford Fleming, C.M.G., C.E., P. Fortin, M.D., G. P. Girdwood, M.D., F. N. Gisborne, M. Inst. C.E., E. Haanel, Ph.D., the Very Reverend T. E. Hamel, M.A., B. J. Harrington, B.A., Ph.D., G. C. Hoffmann, F.I.C., A. Johnson, LL.D., J. T. Loudon, M.A., T. Macfarlane, M.E., J. G. McGregor, M.A., D.Sc., F.R.S.E., L. W. Bailey, M.A., Ph.D., Robert Bell, M.D., C.E., F.G.S., G. M. Dawson, D.S., A.R.S.M., F.G.S., Edwin Gilpin, M.A., F.G.S., J. Bernard Gilpin, M.D., M.R.C.S., the Reverend D. Honeyman, D.C.L., J. M. Jones, F.L.S., the Reverend Professor J. C. K. Laflamme, D.D., J. Macoun, M.A., F.L.S., G. F. Matthew, M.A., Alexander Murray, C.M.G., F.G.S., W. Osler, M.D., W. Saunders, Esquire, D. N. St. Cyr, Esquire, J. F. Whiteaves, F.G.S., and R. Ramsay Wright, M.A., B.Sc., together with such other persons as now are or may hereafter become members of the Society to be hereby incorporated, under the provisions of this Act and the by-laws made under the authority thereof, and their successors, shall be and are hereby constituted a body politic and corporate, by the name of "The Royal Society of Canada," hereinafter called the Society, and may, by any legal title, acquire, hold and enjoy, for the use of the Society, any property whatever, real or personal, and may alienate, sell and dispose of the same, or any part thereof, from time to time and as occasion may require, and other property, real or personal, may acquire instead thereof: Provided always, that the annual value of the real estate held at any one time for the actual use of the Society shall not exceed four thousand dollars.

2. The Society shall not hold any property except as aforesaid and such as shall be derived from the following sources, that is to say: the life, annual and other subscriptions of members, donations, bequests or legacies made to the Society, and such other moneys or property as may be acquired by and from the ordinary transactions of the Society, or may now belong to the existing Society, and the moneys arising from fines and forfeitures lawfully imposed by their by-laws: Provided always, that the Society shall sell and convey any

real estate acquired by them under the provisions of this section within ten years after they shall have acquired the same, unless the same be required for the actual use of the Society, under the provisions of the next preceding section.

3. The affairs and business of the Society shall be managed by such officers and committees, and under such restrictions, touching the powers and duties of such officers and committees, as by by-law in that behalf the Society may, from time to time ordain; and the Society may assign to any of such officers such remuneration as they deem requisite.

4. The Society may make such by-laws, not contrary to law, as they shall deem expedient for the administration and government of the Society, and may repeal, amend or re-enact the same from time to time, observing always, however, such formalities as by such by-laws, or by the by-laws now in force, may be prescribed to that end, and generally shall have all the corporate powers necessary for the purposes of this Act.

5. The present by-laws of the existing Society, not being contrary to law, shall be the by-laws of the Society hereby constituted, until they shall be repealed or altered as aforesaid.

6. Until others shall be elected according to the by-laws of the Society, the present officers of the existing Society shall be those of the Society.

7. All subscriptions and all penalties due to the Society under any by-law, may be recovered by suit in the name of the Society; but any member may withdraw therefrom at any time, on payment of all amounts by him due to the Society, inclusive of his subscription for the year then current, and shall, upon such withdrawal and payment of amounts due, cease to be a member of the Society.

8. No person otherwise competent to be a witness in any suit or prosecution in which the Society may be engaged, shall be deemed incompetent to be such witness by reason of his being or having been a member or officer of the Society.

9. The Society shall make annual reports to the Governor-General and to both Houses of Parliament, containing a general statement of the affairs of the Society, which said reports shall be presented within the first twenty days of every Session of Parliament.



APPENDIX C

BIOLOGICAL STATIONS

MARINE BIOLOGICAL STATION.

This important scientific station, maintained by the Dominion Government under the direction of the Department of Marine and Fisheries, was located during the past year (1905) at Gaspé, in the Province of Quebec. The director of the station (Professor Prince) was detained by pressing duties as chairman of the British Columbia Fisheries Commission, and the Georgian Bay Fisheries Commission, and was prevented from spending any time at Gaspé, but it was anticipated that the duties of acting director would have been fulfilled by Professor E. W. MacBride, of McGill University, in the absence of Professor Ramsay Wright, Toronto University, who was in attendance at the Hellenic Congress in Athens. Dr. Joseph Stafford, lecturer on zoology, McGill University, took charge of the season's work when Professor MacBride found that he could not visit Gaspé. The staff during the season included Professor James Fowler, LL.D., etc., Queen's University; Mr. J. C. Simpson, B.A., McGill University; Dr. Etherington, Queen's University, Kingston; A. Bruce Macallum, Toronto University, and Mr. J. McIntosh, B.A., Toronto University. Dr. Stafford at the close of the season was able to report that he had had "a very good year on the whole, and knew the ground well for next season's work." Professor Fowler made a very thorough study of the remarkable botanical features of the Gaspé peninsula, and his report will almost certainly include a number of species new to our Atlantic flora, if not new to science. Dr. Stafford continued his valuable faunistic survey, and will be able to add considerably to the list of marine invertebrates which is now in the press. He also continued his original researches on the breeding and life-history of edible molluscs, including a survey of the results of the oyster experiments carried on at Malpeque during the years 1903 and 1904, upon which Professor Ramsay Wright has an important report in preparation. The crustacea of the locality and a study of the hydroid forms, which contribute so largely to the food of fishes in the sea, occupied various members of the staff. Mr. Simpson carried on most successful investigations upon the protozoa of the Gaspé waters, and has in progress a valuable account of these minute and lowly animals upon which larval fishes to a considerable extent subsist. On August 29th, the laboratory was honoured by a visit from the late Hon. Raymond Préfontaine, who was accompanied by the Deputy Minister and the Inspector of Fisheries for the Gulf division (Dr. Wakeham). Lack of a suitable dredging steamer and gear prevented the carrying out of deep-sea investigations, and the examinations of the great fishing banks in the Gulf, but it is anticipated that a vessel will be told off to assist in this work, which urgently calls for attention. Considerable addi-

tions have been made to the library of the station; but many *lacunae* remain to be filled, especially works dealing with marine faunas.

The opening of large whaling stations on the north shore of the St. Lawrence will, it is expected, enable the staff of the station to collect much interesting information respecting the structure and habits of whales, their food, breeding resorts, and seasonal migrations. These valuable creatures are difficult to study in their native habitats; but the whaling establishments licensed by the Government, and operating for the first time during the past year (1905) afford rare opportunities for gaining information, and making studies on some of the more obscure points in the structure of different species of the whale order.

Arrangements were made for testing the Sahlström method of preserving fish in a fresh condition at the station. Mr. C. Sahlström explained to the director (Professor Prince) his vacuum process, though the details have not yet been made public. The late Minister of Marine and Fisheries evinced great interest in the project, which it is claimed will preserve freshly-caught fish in a sweet unchanged condition for many months. Circumstances made it necessary to erect the apparatus at Halifax, N.S.; but the samples of preserved haddock, etc., submitted to the director of the station were pronounced wonderfully well-preserved, the texture of the flesh being firm and unaltered, and the edible qualities excellent; but the external appearance of the fish was not inviting and could no doubt be improved.

The activity in the prosecution of practical fishery work and original scientific investigation by the station's staff has continued unabated, and the second part of the "Contributions to Canadian Biology" with ten beautiful plates is in the King's Printer's hands in an advanced condition, and will be ready for issue at an early date. The nature of these reports, constituting the second part of these "Contributions," has already been announced; but a delay which arose in completing the series permitted of some additional reports being included, and the publication will embrace:—"The Plankton of Eastern Nova Scotia waters" by Prof. R. R. Wright, with seven beautiful plates; "The question of Sawdust and Fish-life," a further report and a final report by Professor Knight, also "Effects of Dynamite Explosions on Fish-life," by Professor Knight; "The Flora of Canso," by Professor Fowler; "Fauna of the Atlantic coast," by Dr. Stafford; and "Trematode Parasites of Marine Fishes," by the same; "Diatoms of Canso Harbour." by Dr. A. H. MacKay; "Life-history of herring, ale-wife, shad, etc.," by Professor Prince, with three tinted plates; "The Polyzoa and Fishes of Canso," by Mr. Cornish; "Sea-weeds of Canso," by Principal Robinson; and Professor Prince's account of Dr. Macallum's researches upon the composition of jelly fishes.

THE GEORGIAN BAY BIOLOGICAL STATION.

The Georgian Bay Biological Station was open for biological study from June 5th and the following gentlemen were in attendance during the whole or part of the season: Dr. B. Arthur Bensley, curator of the station, Mr. A. G. Huntsman, B.A., University of Toronto; Mr. I. R. Bell and Mr. J. R. G. Murray, science students of Toronto University.

A destructive windstorm early in July so seriously damaged the dwelling where the staff are accommodated, that it was found impossible to carry out the plan of affording facilities for scientific work to masters in various schools, and the proposed invitation was withdrawn.

In view of the importance of the black bass in the waters of western Ontario, and the general indications of its serious decline, a good deal of attention was devoted to that valuable species. Eggs were gathered and incubated in shallow vessels in the laboratory. The various stages were carefully studied, and accurate drawings were made by Mr. Murray, the young being retained for study until two centimetres in length. Special attention was given to the food of the larval bass, and plankton hauls in the vicinity of the station were made in order to ascertain the nature of the food available for the young during the first stages of active life. Preserved specimens of the young and of the minute floating food in the adjacent waters were added to the collection in the station, indeed, the nucleus of a valuable fisheries museum has been already secured, which will be available for Government purposes when required. Later in the season faunistic investigations were resumed, and Messrs. Bell and Murray devoted their attention to the analysis of the material obtained, while Mr. Huntsman made periodic visits in company with the fishermen to the fishing grounds. The rebuilding of the dwelling for the staff, the erection of a verandah, and the construction of a small wharf, are recommended for this season, while a small gasoline launch and two small boats will be necessary in order to enable the staff to overtake the important fishery investigations urgently awaiting attention.

APPENDIX D

SURVEY OF TIDES AND CURRENTS

SURVEY OF TIDES AND CURRENTS.

This survey, under the charge of Dr. W. B. Dawson, has made continuous progress. The periods of observation on which the tide tables are based are being continually augmented, to improve their accuracy. Much is also being done to enhance the accuracy of the tidal data for the St. Lawrence, by further observations and by working up tidal information secured incidentally by other surveys. In this way, special tide tables are prepared for the points in the river which are still the shallowest, until the dredging operations, now in progress, are completed.

The chief advance this year, has been in British Columbia; and as several points of general interest present themselves, we may confine our review to that coast.

Owing to the planning and directing of tidal work on the St. Lawrence and the Atlantic coast, and the investigations of currents, during the earlier years of this survey, it has not been possible for Dr. Dawson to visit the Pacific coast until the summer of this year. Some headway has already been made, however, in the publication of tide tables for ports in British Columbia and the commencement of tidal observations.

There is still a large part of the coast of British Columbia which is dependent upon the United States tide tables, which is far from satisfactory; as it is thus necessary to compute our tides and currents from some distant port in Alaska, or from a harbour where the tide is of a distinctly different type, such as Port Townsend. Hence our Canadian tide tables already meet with much appreciation.

It is very evident that a large number of the industries on this coast will always be dependent upon water transport, as it would not be possible for a railway to compete with water carriage where the choice exists. This coast has a greater advantage than almost any other in the world for coastal trade, with its series of sheltered inlets and channels forming gigantic natural canals which extend the whole length of the seaboard and cut deeply in toward the interior, for the admission of traffic and supplies, and return freight.

To take advantage of all this, the tides and currents must be known. This is indeed of more importance to navigation than anything else, when once the coasts themselves are charted; as no other aids to navigation can make up to a captain for not knowing which way the current is setting his vessel.

On a coast of such extent and with so many local complications in its tides, it is necessary to devise a comprehensive scheme which will

form a general basis for the details required locally. With this view, the coast may be divided into three regions, (1) the Strait of Georgia, (2) the northern coast to Port Simpson, (3) the outer coast of Vancouver Island. In this scheme, the Strait of Fuca must be considered as an additional region, already commanded by Victoria for which tide tables are published.

To command these various regions, there are three tide gauges which have been in operation, in the past; and six new tidal stations have been erected last season which need not be described in detail.

The strong tidal currents which are found in so many of the passes and inlets are evidently occasioned by the rise and fall of the tide; but it should not be over-looked that their strength is chiefly due to the difference of the time of high or low water in the two directions. It is thus clear that the tide is the basis of the current; and also that correct time for the observations is an essential of the first importance. This is one of the chief difficulties on the coast; and it has been found necessary to use chronometers, or to erect special instruments by which the time can be obtained directly from the sun.

To summarize the results aimed at, it may be said in brief that the time of the tide is the basis of all knowledge of currents and slack water; while the height of the tide is chiefly of importance in harbours for the construction of wharfs, dredging, the outfall of sewers and all such questions.

The main object of this survey, as a branch of the Marine Department, is to deal with the time of the tide; since this is the matter of chief importance to navigation; and the question of levels, even though they are indispensable for the purposes above mentioned, must remain secondary. In the strong tidal currents of British Columbia, it is information as to the time of slack water that is most wanted by the mariner. But the value of reliable levels, which can only be obtained from tidal observations, makes it seem right to take the additional trouble necessary to secure them. The opportunity of this season, has enabled the results with regard to datum planes and bench-marks to be published in a complete form, up to the stage now reached.

There is good hope now that a sound basis is laid for the tidal information required in the province, for the tide itself, the currents, and the levels which result from a continuous tidal record. No doubt there will be need in future for much detail work where channels and passages are so numerous and that there are so many local variations, but on the general plan adopted the apparent complications should disappear when the results are systematically worked out.

Character of the Pacific tide.—In all parts of the world, the tides are found to accord with the varying movements and distances of the moon and the sun. In the North Atlantic, where they were first studied, it happens that they are chiefly influenced by the moon's phases. It was thus supposed that the primary characteristic of all tides was a marked alternation in height from springs to neaps in the period of the synodic month.

The tide of the Pacific, however, can best be described as a declination-tide. Its leading feature is a pronounced diurnal inequality in time and height, which accords with the declination of the moon; and this is also subject to an annual variation with the change in the declination of the sun. The period in which the diurnal inequality recurs is the tropical or declination-month, of 27.2 days; which is shorter than the synodic month and gradually falls back through its period in successive months. As the solar influence is unusually large in the Pacific relatively to the lunar; the annual variation is the more accentuated.

On the open coast of the Pacific, the tide curve is still fairly regular, though showing the diurnal inequality strongly. But in the Strait of Fuca and the region of the Strait of Georgia, which makes up half the coast line in British Columbia and where all the more important harbours are situated, the appearance of the tide curve is anomalous. The high waters are nearly at the same level; and the range depends on the amount of fall to low water, which may be almost inappreciable or very pronounced. During the greater part of the day, there may thus be a long stand or only a slight fluctuation near the high-water level; with a sharp and short drop to the lower low water which occurs once in the day. This type only changes to a fairly symmetrical curve when the moon is on the equator near the time of the equinoxes.

The spring and neap tides are thus reduced to a secondary feature which is usually obscured by the stronger characteristics of the tide. The Establishment, which is so well marked in the Atlantic, is here almost illusory; unless it is strictly reduced to equinoxial and equatorial conditions, in accordance with the definition used in France. It may still be convenient to speak of spring and neap tides, if they are understood to mean the two maxima and the two minima in range or in level which always occur in the period of the lunar month. But the two highest and the two lowest points on the tide curve for the month, may be as much as five days before or after the full or new moon, as these extremes are so largely occasioned by the diurnal inequality.



The extreme tides of the year necessarily occur at the nearest point to the solstices at which the moon reaches its maximum declination.

A tide of this character is apt to be termed irregular by the mariner; as the tropical or declination-month which is its governing period is less familiar and less noticeable than the synodic month of the moon's phases. It is evident, however, that this tide is perfectly astronomical; and its analysis and prediction are just as definite as for any other type of tide.

Mean Sea Level.—With a tide of this type, there is a notable difference between the half-tide level, and the true value of mean sea level. These may differ as much as a foot from each other, even in the case of a tide whose extreme range is only 13 feet. The only accurate value therefore, is the mean ordinate found by the integration of the tide curve, referred to any invariable base line or datum. This mean ordinate fixes the position of the horizontal line which bisects the area of the tide curve; and this also accords with the best definition of mean sea level for any type of tide.

The advantage of a registering tide gauge is much emphasised, with tides of this character. If scale readings are taken by direct observation, which the Admiralty surveyors usually prefer, they must be continuous, day and night, and afterwards plotted as a curve; or little use can be made of them except for the reduction of soundings. A registering tide gauge not only gives the hourly ordinates of the tide curve throughout the year as a basis for mean sea level, but the continuity of the record enables the diurnal inequality to be followed. When this is known, the average and extreme levels of high and low water, and questions of range, can be determined without fear of inaccuracy. The continuous record is equally important with respect to the time of the tide, in which there is a similar inequality of interval.

The question of mean sea level is of unusual interest on the Pacific coast, as there is reason to believe that its elevation is changing. Some indications point to a rise in the level of the coast, at as high a rate as one or two feet per century. It is only from tidal observations properly reduced, that any trustworthy result can be arrived at; and if the change is as rapid as supposed, it will not require an interval of many years to obtain a fair approximation to its amount.

APPENDIX E

REPORTS OF ASSOCIATED SOCIETIES

I.—From *The Women's Canadian Historical Society of Ottawa*,
through MRS. O'CONNOR.

In presenting our report before the Royal Society of Ottawa, we are glad to record an increased activity in the furtherance of the aims and objects of the Society, with an augmented membership and larger attendance at the regular monthly meetings. During the year seven general and six executive meetings have been held at the home of the president, and our treasurer reports a balance of \$26.93. The April meeting was devoted to the business of arranging for a Loan Exhibit, to be held in October, in the new Public Library, which was then expected to be opened in July. The delayed completion of the Library postponed the date of this exhibition from month to month, till after the March meeting it was finally decided to defer the undertaking till next autumn, when the Society resumes its work. The following papers were read:—

“The Early Settlement of Hull,” Mme LeLièvre.

“Canada's Contribution to the International Exhibition of 1900,”
Mrs. W. P. Davis.

“Champlain,” a sketch, Mrs. Grant Needham.

“A Canadian Heroine of 60 years ago,” Miss Carnochan, president
Niagara Historical Society.

“Letter from Japan,” by a former member of the Society now resident in Japan, Miss Sara MacLean.

“Impressions of a visit to Prince Edward Island, with a brief historical sketch of the Island,” Mrs. Ahearn.

“Biographical Sketch with readings from the poems of Isabella Vallency Crawford,” Mrs. J. L. McDougall, Jr..

“Some Facts about Trinity Church, St. John,” Miss Carrie Hill.

Good work was done by the Biographical and Scrap-book committees under the conveners, Mrs. J. L. McDougall and Miss Mary Masson, the former having in preparation a paper on the life of the late Miss Harmon. The third scrap-book is in charge of Mrs. Patrick, during Miss Read's absence abroad.

Our society has given its hearty sympathy and support to the efforts of the Ontario societies to preserve the old fort in Toronto from obliteration, and Mrs. Geo. E. Foster, one of our vice-presidents, represented the Ottawa society at a conference of historical and patriotic societies with the military and municipal officials at Toronto, having this purpose in view. In December Mrs. Ralph Jones' resignation was reluctantly accepted and Mrs. Braddish Billings was elected to fill the office. At the beginning of the year, with the Loan Exhibition in view, it was decided to omit the children's meeting, which has for some years

past formed part of the season's work. Our president, Mrs. Ahearn, and Mrs. Chas. O'Connor, recording secretary, were appointed delegates to the annual meeting of the Royal Society. To our list of honorary members we have added the name of Mr. Martin Griffin, and with our list of active members considerably increased this year, we now look forward confidently to a year of increased usefulness and activity in the beautiful rooms of the Ottawa Public Library, in which we are privileged to meet by kind permission of the library committee.

II.—From *The Ottawa Literary and Scientific Society*, through
MR. A. H. WHITCHER.

Having been appointed delegate from the Ottawa Literary and Scientific Society to this annual meeting of your Society, I have the honour to present a brief report relative to the status of our society during the year ending March 31, 1906.

Increased activity, interest in the work, large average attendance at council meetings, of which fifteen were held during the year, are some of the features of a prosperous year; I think I may say, one of the most prosperous years in the history of the society.

233 volumes have been added to the library, being a greater number than for several previous years. The total number of books in the library is now 5,190. In the purchase of books particular attention has been paid to our own Canadian history.

The society receives many valuable exchanges from many societies scattered over the world, and the published transactions of the society have been given in return. Several sets of the transactions have been printed and provision has been made for the issue of another volume.

The number of exchanges received is 374. These exchanges possess great value for students in all branches of science.

The lecture course for the winter was much appreciated as was evidenced by the large attendance. All the lectures were free to the public.

The following is the programme:—

1905.

Nov. 10.—“Tolstoy and his Message,” Mr. Ernest H. Crosby, of New York.

Nov. 24.—“Before Port Arthur,” Mr. W. Richmond Smith, late war correspondent of London Standard.

Dec. 1.—“Jerusalem,” illustrated, Mr. J. S. Ewart, K.C.

Dec. 8.—“The Canadian Militia under the French Régime,” Mr. Benjamin Sulte, F.R.S.C.

1906.

- Jan. 5.—“The Genius of English, Irish, Scottish and Welsh Song,”
Prof. E. E. Prince, F.R.S.C., with musical illustrations.
- Jan. 19.—“Place of Defence in Canadian National Life,” Mr. C.
Frederick Hamilton, M.A.
- Feb. 2.—Conversazione, Addresses by the President, Dr. T. B. Flint,
and Canon Kittson, musical programme.
- Feb. 23.—“Scandinavia Revisited,” Mr. Thos. Macfarlane, F.R.S.C.,
with musical illustrations.
- Mar. 2.—“The Southern Trail in British Columbia,” Mr. J. M.
Macoun.

At the annual meeting of the society, on the 27th ultimo, the following officers and members of the council were elected for the ensuing year:—

President—Dr. Otto Klotz.

1st Vice-President—Dr. T. B. Flint.

2nd Vice-President—Mr. A. H. Whitcher.

Secretary—Mr. J. C. Martin.

Treasurer—Mr. H. J. Bronskill.

Librarian—Mr. W. H. Harrington.

Curator—Mr. C. H. Scott.

Members of Council without office—Dr. Charles Morse, Mr. Thos. Macfarlane, Mr. H. H. Bligh. K.C.

III.—From *The Natural History Society of New Brunswick*, through the HON. SENATOR ELLIS.

On behalf of the council and members of the Natural History Society of New Brunswick I have the honour to present the following report:—

Members of our society are still actively engaged along lines of original investigation and their labours have been very successful, they having been fortunate enough to discover some new plants in the Dadoxylon Sandstone, and which are fully described in the bulletin of the society for 1905.

During the year the work of the society has progressed in every department; the lectures of the various courses having been well attended and they have evoked considerable interest.

Several of the papers read before the society have been published in the annual bulletin, which is larger than usual, and which I have the honour to present to the Royal Society.

Ten regular meetings, including the annual and one special meeting, were held during the year.

The following are the dates of the meetings and the titles of the papers read:—

- Jan. 3.—(a) "Birds that Hunt and are Hunted," by Mr. A. Gordon Leavitt.
(b) "Additions to the List of New Brunswick Plants," by G. U. Hay, D.Sc.
(c) "The Ourious Phenomenon of a Forest Fire near Neguac, Northumberland Co.," by W. F. Ganong, Ph.D.
- Jan. 17.—Annual Meeting. Election of Officers.
- Feb. 7.—(a) "The Magdalen Islands; their People and History," by Mr. W. F. Hatheway.
(b) "Physiography of Grand Lake and its Affluents," by Mr. W. S. Butler.
(c) "On the Limits of the Great Miramichi Fire in 1825," by W. F. Ganong, Ph.D.
- Mar. 7.—(a) "Pain," by G. G. Melvin, M.D.
(b) "Archæological Notes," by Mr. S. W. Kain.
(c) "On Contour Map of New Brunswick," by W. F. Ganong, Ph.D.
- April 4.—(a) "Notes on our Insect Collection," by Mr. Wm. McIntosh.
(b) "Notes on a Grindstone Quarry at Stonehaven, Gloucester Co.," by Geoffrey Stead, C.E.
(c) "On the Fact Basis of the Fire or Phantom Ship of Bay Chaleur," W. F. Ganong, Ph.D.
(d) "Notes on our Fishes," Mr. C. F. B. Rowe.
- May 2.—(a) "The Natural History and Physiography of New Brunswick," by W. F. Ganong, Ph.D.
(b) "Bird Notes," by Mr. J. W. Banks.
- June 6.—(a) "The Hydrography of New Brunswick," by Mr. J. W. Bailey.
(b) "Geology of Rockwood Park," by G. F. Matthew, D.Sc.
- Oct. 3.—"Vegetation of the Earth in Remote Times and its Relation to Climate," by G. F. Matthew, D.Sc.
- Nov. 7.—"Gypsum Deposits of Albert Co.," by L. W. Bailey, Ph.D.
- Dec. 7.—"The Physiographic Characteristics of the Tracadie River; On the Height and other Characteristics of Wilkinson Mountain; On Walrus Bones from Miscou Island," by W. F. Ganong, Ph.D.

A series of elementary lectures or talks was given in the rooms on Tuesday evenings, not occupied by the regular meetings of the Society during the months of January, February and March, for the benefit of the ordinary and associate members, and for pupils of the public schools. These lectures proved very interesting and were fairly well attended.

The following were the dates and the titles of the papers read:—

- Jan. 10 and 24.—“The Elements of New Brunswick Geology,” Dr. G. F. Matthew.
 Jan. 31.—“A Preliminary Talk on Plant Life,” by Mr. Thomas Stothart.
 Feb. 14 and 21.—“The Trees of New Brunswick,” by Dr. G. U. Hay.
 Feb. 28.—“On Bird Classification,” by Mr. A. Gordon Leavitt.
 Mar. 14.—“On Types of Insects,” by Mr. Wm. McIntosh.
 Mar. 21 and 28.—“On Fishes, Reptiles, and Frogs,” by Mr. Chas. F. B. Rowe.

Throughout the year the Ladies' Association heartily co-operated in the work of the society, giving their assistance on all occasions. The following course of lectures opened with a re-union on Thursday, January 5th. There was a large attendance of members.

- Jan. 12.—“Emerson and Nature,” by Mrs. Emma S. Fiske.
 19.—“Scenes in Rome and Naples,” by Mrs. George Murray.
 26.—“Glimpses of a Quaint Old German Town,” by Miss Homer.
 Feb. 2.—Children's Day—Nuts, by Miss Ethel Jarvis.
 9.—“Notes on China,” by Mrs. James R. Warner, and Miss Purves.
 16.—“Scenes from the Life of Huxley,” by Mrs. G. F. Matthew.
 23.—“Some Relics of the French Occupation of Acadia,” by Miss Alice D. Jack.
 Mar. 2.—Children's Day—“Our Feathered Friends,” by Mr. A. Gordon Leavitt.
 9.—“The Land of ‘Kai-ora,’” by Miss Olive.
 16.—“Voices from the Meadow,” by Mrs. George U. Hay.
 23.—Reunion of members.

During the year the membership has been increased by the admission of two ordinary and nineteen associate members, and one corresponding member, making a total of 200.

Officers.

President—Hon. J. V. Ellis.
Vice-Presidents—G. F. Matthew, G. U. Hay.
Treasurer—A. Gordon Leavitt.
Secretary—W. L. McDiarmid.
Librarian—W. L. Ellis, M.D.
Curators—S. W. Kain, Wm. McIntosh, J. W. Banks.
Additional Members of Council—H. G. Addy, M.D., J. Roy
Campbell, James A. Estey.

Ladies' Association Branch.

President—Mrs. G. F. Matthew.
Vice-Presidents—Mrs. G. U. Hay, Mrs. H. G. Addy.
Secretary-Treasurer—Miss Edith McBeath.

IV.—From *The Ottawa Field-Naturalists' Club*, through
MR. W. J. WILSON.

Having been selected to represent the Ottawa Field-Naturalists' Club at this meeting of the Royal Society, I have much pleasure in presenting the following summary of the work done during the year ending March 20th, 1906.

The Club's year begins in March so that the new officers have an opportunity of arranging the field excursions which are the chief feature in our work. The sub-excursions were begun early in April and continued every fine Saturday afternoon through May and into June, and were again resumed in October. The attendance at these excursions sometimes reached one hundred. Three general excursions were held as follows: May 27, to Chelsea; June 10, to Carp; September 23, to Chelsea. The excursion to Chelsea on May 27 was perhaps the most largely attended excursion in the history of the club, due to the fact that both the Royal Society and the Carleton County Teachers' Association met in Ottawa during that week. Such distinguished visitors as Dr. C. F. Hodge, of Clark University, Dr. A. H. MacKay, Superintendent of Education for Nova Scotia, and Dr. G. U. Hay, editor of the *Educational Review*, were present and delivered able addresses.

The council favours the continuance of outdoor work throughout the year, and to that end had planned two snowshoe tramps, which, however, were cancelled for lack of snow.

A summer school for teachers was held in Ottawa last July. Several members of the club delivered lectures in the nature study course and

aided in the field work. Dr. White did practical field work with the class in physical geography. Mr. Putman delivered illustrated lectures and conducted experimental work in botany, Mr. Attwood delivered lectures on minerals and did a great deal of field work, Dr. Fletcher gave two lectures on birds and two on insects, Prof. Prince lectured on Fish Life, Dr. Ami on Ferns, Dr. Saunders on Evergreens, Mr. R. B. Whyte on the Pleasures of gardening and other members on various other subjects.

Reports showing the work done throughout the year by the various branches have been read before the club. The report of the geological branch has been printed in *The Ottawa Naturalist*, and the other reports will appear at an early date. Most of the branches are now holding fortnightly or monthly meetings at the homes of the members for the purpose of discussing subjects of especial interest to the respective branches.

The members of the Entomological Branch have made some notable additions to the local lists during the past summer. Mr. Arthur Gibson made, on July 6, the catch of the year, a perfect specimen of the very rare and local moth *Hepialus thule*, Strkr. Up to the present time this is the only specimen which is known with certainty to have been taken at any other place than Montreal, from which locality the species was originally described and where a few specimens are taken yearly. Mr. C. H. Young has continued his studies of the micro-lepidoptera and has added many new species to the Canadian fauna. All of these have been described by Mr. W. D. Kearfott, of Montclair, N.J., who is making a specialty of these beautiful insects. Mr. W. Metcalfe has continued his studies of the local hemiptera and has added many new records. Mr. J. W. Baldwin made a very remarkable capture of the West Indian moth, *Melipotis fasciolaris*, Hbn. It can only be surmised that the chrysalis of this handsome moth may have been introduced, as has been the case with many other insects, in a bunch of bananas. The Ottawa Fruit Exchange building is close to Mr. Baldwin's house, where the insect was taken in the garden. Six specimens of the handsome elater, *Pityobius anguinus*, Lec., figured in the first transactions of the club under the name of *Pityobius billingsii*, were taken by Messrs. Baldwin and Gibson at the electric light on the 28th June. A month later a fine female was taken by Dr. Fletcher, floating on the surface of the water, into which it had fallen. Many other insects of more or less interest were taken during the summer and the interest in this branch of work has been kept up steadily. Good work has been done by the leaders in working out life-histories of beneficial and injurious insects.

Members of the Geological Branch have made special study of some interesting localities in the Ottawa district. The sands and gravels of McKay Lake have been examined and special study has been made of the geology of Strathcona Park, where the excavations in the Utica have afforded an excellent opportunity for studying the formation; the Chazy at Rockcliffe has yielded an excellent series of slabs exhibiting tracks and trails of marine organisms. The most interesting local find, however, was the discovery of a large number of curved hornblende crystals in a vein of mica at Carp by Dr. Ami. These curved crystals were new to the geologists and hitherto unrecorded in Canada.

The Botanical Branch has held fortnightly meetings throughout the year except during the summer months. The most important matter taken up was the publication of a complete list of the plants of the Ottawa district. Since Dr. Fletcher's "*Flora Ottawaensis*" was published many new species have been added to the local flora, and the work of specialists has made a thorough study of the local flora necessary. This list is to be issued as a publication of the Geological Survey. The Botanical Branch invite co-operation of all local botanists in this work of revision, and would call special attention to the Rosaceæ; the study of this large order of plants will certainly result in the addition of several species to the local list.

The Zoological Branch held two very profitable meetings during the winter. At the first meeting Prof. Prince read an interesting paper on the function of the swim bladder of fishes, an outline of which appears in the report of the branch. At the second meeting Prof. Macoun pointed out the great amount of work that can be done in procuring specimens of the numerous species of small mammals to be found near Ottawa, and also pointed out the ease with which this could be done.

The report of the Zoological Branch contains a list prepared by Mr. Halkett of the fishes of the Ottawa district preserved in the Fisheries Museum with the localities where they were taken. It also records a number of interesting observations made by members of the branch during the year.

The Ornithological Branch, although small, consists of a number of enthusiastic workers. Monthly meetings have been held since early last fall at which much systematic work has been planned. The vicinity of Ottawa is to be divided among the members of the branch for active field work, and the antiquated local list published by the club many years ago is to be thoroughly worked over. Some interesting additions have already been made to the local records, such as the appearance of the short-billed marsh wren, a breeding record of the screech owl, and the

casual occurrence of the glaucous gull. The great grey owl, a rare visitor from the north, has been seen this winter. One specimen was secured in East Templeton and another near South March. One of these, a very fine specimen, is now in the collection of Rev. Mr. Eifrig.

Mr. W. E. Saunders, of London, who is an active member of the club, has done valuable work in compiling a list of birds new to Ontario which have been taken in the Western Peninsula since the issuance of Mellwraith's revised work. This list appears in No. 11 of the volume of the *Ottawa Naturalist* just completed.

Volume XIX of *The Ottawa Naturalist*, the official organ of the club, has been published under the editorship of Mr. J. M. Macoun. It consists of twelve numbers which contain in all 249 pages and four plates. The following are among the papers that appear in this volume:

1. "A New Marine Sponge from the Pacific Coast of Canada," Lawrence M. Lambe, F.G.S.
2. "Notes on Fresh-water Rhizopods," W. S. Odell.
3. "Food Value of Certain Mushrooms," Prof. Shutt, M.A., and H. W. Charlton, B.A. Sc.
4. "Popular Entomology," Arthur Gibson.
5. "Glaciation of Mount Orford," R. Chalmers, LL.D.
6. "Nesting of Night-hawk in Ottawa," Rev. G. Eifrig.
7. "Notes on Fresh-water Shells from the Yukon Territory," Dr. J. F. Whiteaves.
8. "Nature's Method of Re-seeding the Red and White Pine," P. Cox.
9. "A Naturalist in the Frozen North," A. Halkett.
10. "Eggs of the Scarlet Water-Mite," Prof. E. E. Prince.
11. "Sthenopis thule at Ottawa," Arthur Gibson.
12. "Bird Migration," Jas. Bouteiller.
13. "Ontario Ornithological Notes (Winter 1904-05)," A. B. Klugh.
14. "Notes on the Fauna and Climate of the Lièvre River," E. E. Lemieux.
15. "Why our Field and Roadside Weeds are introduced species," W. T. Macoun.
16. "The Hair-eel (*Gordius aquaticus*)," Prof. E. E. Prince.
17. "The Red-breasted Nuthatch," Wm. H. Moore.
18. "On so-called *Silene Menziesii*," Ed. L. Greene.
19. "A New Northern Antennaria," Ed. L. Greene.
20. "A New Goldenrod from Gaspé Peninsula," M. L. Fernald.
21. "Extracts from Diary of the late Robt. Elliott," W. E. Saunders.

22. "Descriptions of New Species of Testudo and Baena with remarks on some Cretaceous forms," L. M. Lambe.

23. "Notes on Some British Columbia Mammals," Wm. Spreadborough.

24. "The Fly Agaric, and its effects on Cattle," Norman Criddle.

25. "Birds New to Ontario," W. Saunders.

26. "Eggs of the Fresh-water Ling," Prof. Prince and Andrew Halkett.

27. "Eupithecia Youngata," George W. Taylor.

28. "Cultivation of Native Orchids," J. H. C. Dempsey.

In addition to these, there have been published several short notes, book reviews, accounts of branch meetings, etc.

The series of articles on "Nature Study," edited by Dr. Jas. Fletcher, has been continued. In this volume the following papers appear:

1. "Nature Study," Dr. Sinclair.

2. "The Clouded Sulphur Butterfly," Dr. Fletcher.

3. "Short Introduction to some of our Common Birds," Rev. G. Eifrig.

4. "Field Work at the Ottawa Normal School Summer Course for Teachers," A. E. Attwood.

5. "Ottawa Summer School for Teachers," J. H. Putman.

6. "Woolly-Bear Caterpillars," Arthur Gibson.

7. "Nature Observations at Home," Prof. Lochhead.

8. "Mother nature and her boys. An Institute that brings them together," G. J. Atkinson.

9. "The School Garden and the Country School," Geo. D. Fuller.

In all, some 30 articles on nature study have appeared in *The Ottawa Naturalist* during the past three years. They are of a popular and decidedly practical nature and have added much valuable material to the current literature on this subject. The papers published during the past year have all been contributed by scientists and educationists actively engaged in working out the best courses and methods in nature study. 5,500 of each of these papers have been printed in pamphlet form and distributed throughout Canada; 2,200 of these go to the teachers of Toronto, 500 to the Macdonald Institute of Guelph for use in the Nature Study Department of the Ontario Agricultural College, and 1,000 to Dr. Robertson, 500 of which are distributed among his nature study instructors in various centres.

The following programme of winter soirées has been carried out with some slight omissions and changes in dates. The attendance at all the meetings has been most gratifying.

1905.

Dec. 12.—The President's Address and Report.

Address, Dr. J. F. White, Principal of the Normal School.

Illustrated Lecture: "Apparent Consciousness in Plants and Animals," by the President, Dr. S. B. Sinclair.

1906.

Jan. 9.—Illustrated Lecture: "The Geology of Strathcona Park and other Ottawa localities," Dr H. M. Ami.

"Report of the Geological Branch," W. J. Wilson, Ph.B.

Jan. 23.—"The Migration of Birds," C. W. G. Eifrig. Illustrated by specimens.

"Report of the Ornithological Branch," Mr. A. G. Kingston.

Feb. 6.—Illustrated Lecture: "Trees, Shrubs and Plants for the Adornment of Home," Dr. W. Saunders, of the Central Experimental Farm.

Feb. 27.—Conversational Evening: short addresses on various subjects.

Prof. J. Macoun: "Botany," Dr. Otto Klotz: "Gravity."

Mar. 13.—"Fish Culture," Prof. E. E. Prince, Commissioner of Fisheries for Canada." Illustrated by specimens.

Mar. 20.—Annual meeting.

Address by Mr. A. Gibson: "Method of Studying Insects followed at Central Experimental Farm."

Since the Normal School course has been lengthened to a year, the students have been able to engage in the field work of the club during the spring and fall months and also to attend the winter soirées. The result has been that the students, having become interested in the field work, have attended the soirées almost in a body. The club realizes that through the teachers it has a most valuable medium of disseminating its influence, and therefore it keenly appreciates the interest that has been displayed throughout the year.

In accordance with a resolution passed at the annual meeting a large part of the books in our library have been transferred to the Public Library, where they remain the property of the Society and will be used as reference books.

Officers.

President.—W. J. Wilson, Ph.B.

Vice-Presidents.—A. E. Attwood, M.A.; Frank T. Shutt, M.A., F.R.S.C.

Librarian.—J. W. Baldwin.

Secretary.—T. E. Clarke, 470 O'Connor Street.

Treasurer.—Arthur Gibson, Central Experimental Farm.

Committee.—Mr. A. G. Kingston, Mr. J. M. Macoun, Mr. W. T. Macoun, Dr. H. M. Ami, Mr. A. Halkett, Miss M. McK. Scott, Miss A. I. Matthews, Miss R. B. McQuesten.

V.—From *The Nova Scotian Institute of Science, Halifax*, through
DR. HENRY S. POOLE.

The Nova Scotian Institute of Science, through its delegate, begs to present the following report of its proceedings during its forty-fourth annual session.

Meetings were held throughout the session from October, 1905, to May, 1906, inclusive.

Officers for the year 1905-06 were elected as follows:—

President—F. W. W. Doane, C.E., *ex officio* F.R.M.S.

1st Vice-President—Prof. Ebenezer MacKay, Ph.D.

2nd Vice-President—Professor J. E. Woodman, D.Sc.

Treasurer—William McKerron.

Corresponding Secretary—A. H. MacKay, LL.D., F.R.S.C.

Recording Secretary—Harry Piers.

Librarian—Harry Piers.

Other Members of Council—Maynard Bowman, B.A.; Watson L. Bishop; Edwin Gilpin, Jr., LL.D., F.R.S.C., I.S.O.; Alexander McKay; J. B. McCarthy, M.A., B.Sc.; Professor F. H. Sexton, and Henry S. Poole, D.Sc., Assoc. R.S.M., F.G.S., F.R.S.C.

The library of the society continued its very rapid growth, the number of accessions during the year 1905 being 1,911 books and pamphlets. The library forms part of the Provincial Science Library under the charge of the Provincial Government, and is free to any resident in the province of Nova Scotia. A steadily increasing use of the books has been reported each year since it was thrown open to the public.

The finances of the society are satisfactory, owing to the generous aid received from the Provincial Government.

The Proceedings and Transactions, Vol. X, part 2, for 1903-04, have just been published, and Vol. X, part 3, is now in press. Owing to the many official duties of the editor, the publication of the Transactions is somewhat in arrears, but an effort is being made to bring it once more up to date.

During the session the following papers were read:—

- 1.—“Presidential Address,” by H. S. Poole, D.Sc., Assoc. R.S.M., F.G.S., F.R.S.C.

- 2.—“On the Flora of McNab’s Island, Halifax,” by Captain J. H. Barbour, M.D., R.A.M.C.
- 3.—“Catalogue of the Birds of Prince Edward Island,” by John MacSwain.
- 4.—“Mining, Is It a Science?” by W. E. Lishman, M.A., M. Inst. M.E.
- 5.—“Fungi of Nova Scotia; First Supplementary List,” by A. H. MacKay, LL.D., F.R.S.C.
- 6.—“Halifax Water Works,” by H. W. Johnston, C.E.
- 7.—“The Oil-fields of Eastern Canada,” by R. W. Ells, LL.D.
- 8.—“The Frost and Drought of 1905,” by F. W. W. Doane, C.E.
- 9.—“Eels in Water Pipes and their Migration,” by W. L. Bishop.
- 10.—“Notes on Protective Colouring,” by Frank H. Reid.
- 11.—“The Grignard Synthesis; Action of Phenyl Magnesium Bromide on Camphor,” by H. Jermain Creighton.
- 12.—“Contribution to the Study of Hydroxylamin,” by G. M. Johnstone MacKay, B.A.
- 13.—“The Water Powers on the Mersey River, N.S.,” by W. G. Yors-ton, C.E.
- 14.—“On the Damage done to Timber by *Teredo navalis* and *Limnoria lignorum*,” by Roderick McColl, C.E.
- 15.—“Phenological Observations, Canada, 1905,” by A. H. MacKay, LL.D., F.R.S.C.
- 16.—“Water-rolled Weed-balls,” by A. H. MacKay, LL.D., F.R.S.C.

VI.—From *The Natural History Society of Montreal*, through
DR. NICHOLS.

The following report of the work of the Natural History Society for the session of 1905-1906 is respectfully submitted for the consideration of the Royal Society of Canada.

The officers and members of the above society have pleasure in reporting a most successful year’s work. Keeping in mind the purpose for which the association was formed, namely, to encourage the study of nature among its members, to foster the love of natural objects among the general public, and, in a word, to disseminate and popularize these special branches of science, they have to a large extent followed the methods which have proved so successful in former years, but with the expectation in the comparatively near future of embracing an even larger scope. In general, the objects mentioned have been carried out by means of regular monthly meetings of a largely scientific nature; free evening lectures of a popular kind; weekly after-

noon talks, usually illustrated, for children and young people; opportunities for study offered by the museum and library; the publication of its scientific organ, *The Canadian Record of Science*; excursions to places of interest in the vicinity of Montreal; and an active interest in those scientific matters of importance to the well-being of the general body politic.

To particularize the work done on the above lines the following account may be given:

The regular monthly meetings have been held as usual, the papers of scientific character presented being as follows:—

1905.

Oct. 25.—“An Account of a Blazing Beach on the Maine Coast,” Prof. D. P. Penhallow.

“A Notice of some Fossil Plants from the Pleistocene of the Abitibi River,” Prof. Penhallow.

“Notes on the Geology of the Abitibi District,” Dr. Wilson.

Nov. 25.—“Fungi collected at Cap-à-l’Aigle,” Rev. Dr. Campbell.

“Relations of Sun Spots and Sun Clouds,” Mr. Stewart.

1906.

Jan. 29.—“The Distribution of Forests in Tertiary Time and their Relations to the present Great Plains,” Prof. Penhallow.

“Some Recent Studies respecting the Nuclei of the Lower Forms of Plant Life,” Miss Carrie M. Derick.

Mar. 26.—“Some Recent Developments on the Production of Plant Hybrids,” Miss Carrie M. Derick.

April 30.—“A Remarkable Tumour of the White Birch,” Prof. Penhallow.

“Distribution of Plants in the Cretaceous Period,” Prof. Penhallow.

The Annual Somerville Course of Lectures was given as follows:—

Jan. 18.—“Lime, Soda and Soap,” Prof. Nevil Norton Evans, M.Sc., McGill University.

Jan. 25.—“The Labrador Eclipse Expedition,” Rev. I. W. Kavanagh, S.J., M.A., B.Sc., Science Master, Loyola College.

Feb. 1.—“Food Adulteration in Canada,” Dr. J. T. Donald, Official Analyst to the Dominion Government.

Feb. 8.—“Jamaica, the Isle of Springs,” Theo. H. Wardleworth, F.L.S.

Feb. 15.—“The Origin of New Forms of Plant Life,” Carrie M. Derick, M.A., Assist. Lecturer in Botany, McGill University.

Feb. 22.—“South and East Africa as seen during the Meeting of the British Association in 1905,” Dr. John B. Porter, Prof. of Mining and Metallurgy, McGill University.

The Young People's Half-Hour Series of Talks on Natural History for 1906 was as follows:—

Jan. 20.—“Buds,” Carrie M. Derick, M.A.

Jan. 27.—“The Story of a Piece of Wood,” J. S. Buchan, K.C., B.C.L.

Feb. 3.—“A Talk on Plants,” S. S. Bain, Esq.

Feb. 10.—“A Can of Salmon,” Harry Bragg, Esq.

Feb. 17.—“By-Paths in an Invisible Garden,” Prof. A. G. Nicholls, M.A., M.D.

Feb. 24.—“How Paper is Made,” Chas. S. J. Phillips, Esq.

The attendance of members and others on the above courses has been very gratifying and shows an increasing interest in matters scientific.

A matter worthy of special note is the *Conversazione* which was held under the auspices of the society in the Natural History Building on February 22nd. This meeting, the first of the kind held for ten years, was graced by the presence of His Excellency Earl Grey, to whom a fitting address was presented by the society, together with a souvenir of historical interest. The *conversazione* was entirely satisfactory from every point of view.

The donations to the museum have not been particularly numerous this year, but have been of considerable importance.

Contributions to the library continue to be made, there being now about 5,500 volumes in the care of the society.

The *Canadian Record of Science* keeps up its good record for scientific and general excellence, and, under the able editorship of Dr. Penhallow, it is hoped that it will appear at regular quarterly intervals, and make its way to the front as the standard scientific journal of the kind for the whole of Canada. To this end it is hoped that a grant from the Government, for which application has been made, will be re-established.

The annual Field Day was held at Mt. Johnson and was very successful. The attendance was very large and the arrangements for the comfort of the excursionists were well carried out.

In the report of last year reference was made to the interest in the question of the depredations of the Tussock Moth on our shade trees. As a consequence of this crusade, measures, which unfortunately were only partially successful, were adopted in conjunction with the civic authorities to limit the ravages of this insect. As a result of

our efforts the dangers accruing from this pest have been more forcibly brought home to those most directly concerned, and this spring we expect that more vigorous measures will be adopted towards the extermination of the pest. As another example of the wide-reaching interests of the society may be mentioned the fact that attention was called to the wanton destruction of sea-gulls in the lower St. Lawrence and steps were taken to memorialize the Federal Government to inquire into the matter and to take the necessary steps to put a stop to the evil.

During the past year the work of the society has been hampered by the lack of sufficient and suitable accommodation for the prosecution of its distinctive work. More especially has this been noticed in connection with the museum and library, a great amount of the material being inaccessible on account of the lack of space to display it. In this connection the society has taken an important and decisive step in the direction of better things. It has disposed of the old building, which has been so long its home and a scientific landmark in the city, and has acquired a most desirable and suitable site, consisting of about 10,000 square feet, on the best portion of Drummond Street, where its temporary quarters have been located. On this ground it has been decided to erect a modern building, which will meet the increased requirements of the society, and be a credit to the city of Montreal. To this end an influential and numerous building committee has been struck and immediate steps are to be taken to carry the society's desires into effect. As a consequence of these changes it has been found necessary to store the various specimens and books in suitable places, so that for the coming year they will not be available for reference, and to this extent the society's usefulness will be curtailed until the new home is an accomplished fact. Realizing this, and with the idea of in some measure compensating for it, the society has decided to extend its work on the line of free public lectures to be given in different centres of the city and with co-operation of various bodies, like the Tuberculosis League, the Local Council of Women, the Pure Milk League, the Hygiene Committee, the Westmount School Commissioners, the Alexandra Hospital, and St. Paul's Hospital. The subjects that will be dealt with include matters of hygiene, public health, decoration, materials and forms of construction, and will be dealt with in popular ways by competent lecturers. Some of these lectures are designed to meet the special requirements of artisans, and where necessary will be delivered both in English and French.

A notable increase has been noted in the matter of new members, there being some fifty-three enrolled during the past twelve months.

It is confidently expected that this number will be still more increased in view of the greater attractions which will be afforded by the increased facilities which it is hoped will be offered by the society in the not very distant future. We have to regret the death of one of our members, that of the late Hon. R. Préfontaine.

The society is greatly indebted to Mr. Alfred Griffin for his valuable and enthusiastic services cheerfully placed at its disposal.

Officers.

Hon. President—Lord Stratheona and Mount Royal.

President—Dr. D. P. Penhallow.

Vice-Presidents—Frank D. Adams, Ph.D., F.R.S.C.; J. S. Buchan, K.C., B.C.L.; Rev. Robert Campbell, D.D.; Albert Holden; J. H. Joseph; E. W. McBride, M.A., D.Sc.; Prof. T. Wesley Mills, M.D., F.R.S.C.; Hon. J. K. Ward.

Hon. Recording Secretary—F. W. Richards.

Hon. Corresponding Secretary—C. E. H. Phillips.

Hon. Treasurer—Chas. S. J. Phillips.

Hon. Curator—A. E. Norris.

Members of Council—J. A. U. Beaudry, C.E., Chairman; Prof. J. Bemrose, F.I.C., F.C.S.; J. H. Burland, Joseph Fortier, John Harper, F. McLennan, K.C.; Dr. A. G. Nicholls, Alex. Robertson, B.A. Superintendent—Alfred Griffin.

VII.—From *The Entomological Society of Ontario*, through MR. A. F. WINN.

As delegate from the Entomological Society of Ontario, it is my pleasing duty to report another year of steady progress, and that our membership is increasing very rapidly. At your last meeting the establishment of a branch in British Columbia was mentioned, and since then another has been formed in Guelph, Ont., where there are a number of active and enthusiastic entomologists.

The parent society in London, with its branches at Quebec, Montreal, Toronto, Guelph and Vancouver, and active members in every province of the Dominion is able to accomplish much that would be impossible if the sphere of work were limited to a more restricted area.

The last volume, No. 38, of our monthly magazine, *The Canadian Entomologist*, contains 426 pages—a contrast with the first modest one of 110 pages—and is illustrated with twenty-nine figures in the text from original drawings, and seven full page plates, one of the

latter being a three colour process plate of moths, showing the beauty as well as scientific accuracy of this style of illustration. Among the sixty-two contributors to its pages, some are from such distant places as Jamaica, W.I.; Honolulu, and the Philippine Islands. Eleven new genera of insects are described, and one hundred and forty-two new species. Articles on new species and varieties of Lepidoptera, by Dr. J. B. Smith, Dr. Wm. Barnes, Dr. H. G. Dyar, Prof. Fernald, Miss Murtfeldt, Messrs. H. H. Lyman, F. H. Woolley-Dod, A. Gibson, W. D. Kearfott.

Coleoptera, by Prof. H. F. Wickham, Major T. L. Casey, Messrs. Frederick Knab and Wm. Knaus; Orthoptera, by Messrs. E. M. Walker, and W. T. Davis; Hemiptera, by Messrs. J. R. de la Torre Bueno, E. D. Ball, D. Lange, and G. W. Kirkaldy; Hymenoptera, by Dr. W. H. Ashmead and J. H. Lovell; Diptera, by Mr. D. W. Coquillett, Miss C. S. Ludlow and Dr. Grabham. Life histories are given more or less completely of *Empithoea interrupto fasciata*,—*Apantesis virgo*, parthenice and rectilinia, by Mr. A. Gibson; *Apantesis proxima*, by Dr. O. Siefert; *Gortyna thalictri*, Mr. H. H. Lyman; *Delphastus pusillus* by Mr. W. E. Britton.

A series of articles on Practical and Popular Entomology consists of the following:—

“The Pear-tree Psylla and how to deal with it,” by Mr. Geo. E. Fisher; “Entomology in Schools,” by Mr. H. S. Saunders; “How do Insects pass the Winter?” by Dr. James Fletcher; “Notes on collecting Aquatic Hemiptera,” by Mr. J. R. de la Torre Bueno; “Canadian Three-colour Process Illustration,” by Dr. James Fletcher; “The Struggle with the Codling Moth,” by Prof. W. Lochhead; “Granary Insects,” by Mr. A. Gibson; “A Method for Measuring Insects,” by Mr. J. R. de la Torre Bueno; “The Buffalo Carpet Beetle,” by Dr. James Fletcher.

Articles on Classification include a catalogue of the Aphidae, by Mr. G. W. Kirkaldy; “The Bees of Oregon,” by H. L. Viereck and others; “The Three Ranatras of the Eastern United States,” by Mr. J. R. de la Torre Bueno; “Mosquito Notes,” by Miss C. S. Ludlow.

Among the miscellaneous papers may be mentioned,—“Observations on Lampyridae,” by Mr. Frederick Knab; “Notes on Types in the British Museum,” by Mr. H. H. Lyman; “Remarkable Flight of *Corisa* (Waterboatmen),” by Mr. D. Lange; “Spiders of Rockport Cave, Mo.,” by Mr. C. R. Crosby; “Influence of the Apidae upon Geographical Distribution of certain Floral Types,” by Mr. J. A. Harris; “Oviposition of *Bibio femorata*,” by Mr. A. H. Girault.

Book notices have appeared promptly of new entomological works.

The forty-second annual meeting was held in October at the Ontario Agricultural College, Guelph, with an attendance at some of the meetings of over one hundred, and the society was favoured with the presence of Prof. John B. Smith, State Entomologist of New Jersey. Reports were presented on the injurious and other insects of the various districts in Ontario, from the different branches and sections of the society, and addresses and papers were given on a variety of subjects.

The thirty-sixth annual report of the society to the Ontario Government has been published, comprising one hundred and forty-four pages, and, as usual, contains a full account of the work of the previous year, and the papers read at the annual meeting, as well as numerous articles of an economic nature, giving to fruit-growers and agriculturalists an accurate account of injurious insects along with the best methods of attacking them.

Among these may be mentioned,—“A Review of the Mosquito Work in New Jersey,” by Dr. J. B. Smith; “Experiments against the San José Scale,” by Prof. Lochhead; “Entomological Conditions in North Carolina,” by Prof. F. Sherman; “Reports on Insects of the Season 1905,” by Prof. Lochhead, Dr. Fletcher, Dr. Fyles, Dr. Bethune, and Mr. C. Stevenson; “The Tussock Moths,” by Dr. Fyles and Mr. H. H. Lyman; “The Phlox Mite; The Blue Spruce Fly; and, On Bumble Bees that Fertilize the Red Clover,” by Mr. T. D. Jarvis; “Forest Insects,” by Rev. Dr. Fyles and Mr. E. J. Zavitz; “The Advantage and Disadvantage of the Canadian Entomologist,” by Rev. Dr. Fyles; “Butterfly Collecting in Canada,” by Mrs. Nicholl; “Orthoptera and Odonata from Algonquin Park,” by Mr. E. M. Walker; “Insects as Nature Studies,” by Mr. S. B. McCready; “Injurious Insects of the Flower Garden,” by Mr. Arthur Gibson.

The library now consists of over eighteen hundred volumes, and a card catalogue according to subjects has been begun. The collections at London are open to the public three days a week, and advantage is taken of this opportunity, the number of visitors being increasing.

The branches are all in a satisfactory state, and our friends in British Columbia have decided to issue a quarterly “Bulletin,” the first number of which has just appeared, and contains much information on the insects of British Columbia, particularly on the Coleoptera. It was felt that as the members in that province were so widely scattered, that a medium of communication would bind them together, and we should like to see the members in the Maritime Provinces and also in the Northwest follow a similar course, so that our society could have a chain of branches from the Atlantic to the Pacific.

VIII.—From *The Numismatic and Antiquarian Society of Montreal*,
through R. W. McLACHLAN.

The Numismatic and Antiquarian Society of Montreal has the honour to report that the following papers have been read before it during the past year:—

1. "De Ramezay and the Chateau de Ramezay," by R. W. McLachlan.
2. "Benjamin Franklin and the Chateau de Ramezay," by R. W. McLachlan.
3. "British Military Gold Medals," by James Reid.
4. "Canadian Coins and Medals added to my collection in 1905," by R. W. McLachlan.
5. "Documents relating to the first Montreal Printer," by R. W. McLachlan.

During the year the museum and national gallery have been re-arranged and a new catalogue prepared and published. Through the sale of the catalogue and the efforts of some friends much of the floating debt, which has hampered the society's work, has been paid; and there are hopes that, by the end of this year, our books will come out with the balance on the right side. Still there is need for a much larger revenue to make the work in the Chateau de Ramezay as efficient as it should be.

The additions to the museum were 40 coins and medals, and 50 Canadian antiquities—total 90.

To the national gallery, 19 portraits, of which three are in oil and three in water colours; 47 Canadian views and 9 plans and maps—total 75.

To the library 748 Canadian books, 274 pamphlets, 93 other books and pamphlets, besides 300 books and publications received as exchanges—total 1,415, making a grand total of 1,580 in all branches.

The bi-centennial of the building of the Chateau de Ramezay was celebrated on the 21st of February last, at which a gold medal, struck to commemorate the occasion, was presented to His Excellency the Governor-General, who honoured the celebration with his presence. A silver medal was also presented to Lady Grey, and bronze ones to the 500 guests present. The President presented an address to His Excellency, giving a short history of the building which the celebration commemorated.

The officers of the society for 1906 are:—

Patron—His Excellency the Governor-General.

Vice-Presidents—Judge L. W. Sicotte, W. D. Lighthall, C. T. Hart, L. G. A. Cresse, Jas. Reid, J. B. Vallée.

Hon. Treasurer—George Durnford.

Hon. Curator—R. W. McLachlan.

Hon. Rec. Secretary—C. A. Harwood.

Hon. Cor. Secretary—Pemberton Smith.

Hon. Librarian—J. A. U. Beaudry.

Members of Council—S. M. Baylis, P. O. Tremblay, L. Gravel, Eugène Lafontaine, J. C. A. Heriot, C. B. Carter, K.C., J. N. Perrault, A. S. Hamelin, Prof. C. W. Colby.

IX.—From *The Literary and Historical Society of Quebec*, through P. B. CASGRAIN.

The Literary and Historical Society of Quebec, through P. B. Casgrain, Esquire, K.C., its president and delegate, begs leave to present to the Royal Society of Canada the following report of their proceedings for the year 1905.

It is and cannot be other than the report of the council for the same period to the general meeting of the members of the society read by the then retiring president, Major Wood, and duly adopted on the 10th January, 1906, as follows:—

As the senior society in Canada, we now enter our 83rd year with the satisfaction of being engaged in work which we are striving to make at least equal to the best achievements in our past career. 1775 — that fateful year for both French and English speaking Canada — is still the main object of our research.

In 1903, under the presidency of Sir James LeMoine, a committee was formed to deal with the erection of historical tablets to commemorate the heroic defenders of Quebec who repulsed the attacks of Montgomery and Arnold. Before the close of 1904, the two splendid bronze shields, for which the Dominion Government made a special grant of \$1,250, were in position. We are glad to be able to report that these tablets have been strongly commended by our late and present patrons, the Earl of Minto and Earl Grey, the latter of whom personally inspected them last summer. They have been welcomed with universal approval in Canada and in other parts of the Empire; and we rejoice to see that they have met with generous recognition by the intelligent public of the United States. In this connection we should add that when the old and well known wooden sign — *Montgomery Fell* — was

taken down by the departmental workmen, our president, whose action was unanimously approved by the council, tried to have it repaired at the society's expense and placed over the exact spot in front of where the barricade had stood.

The Government, however, undertook this themselves, and replaced the sign in its old position.

The principal results of our work on 1775, since the erection of the tablets, has been the publication, in the spring of 1905, of verbatim reprints, in a volume entitled "The Blockade of Quebec in 1775-76 by the American Revolutionists" (*Les Bostonnais*).

The contents comprise: 1. The Journal of Thomas Ainslie; 2. The Journal of an unknown Diarist; 3. The Orderly Book of the British Militia at Quebec, 1775-6; and 4. The Nominal Roll of the French Canadian Militia serving at Quebec during the siege. The preface gives a full account of the successful efforts for the erection of the tablets, and is illustrated by photographs specially taken to show the inscriptions both by themselves, on a large scale, as well as in position on the sites once occupied by the barricades at Près-de-Ville and Sault-au-Matelot.

We have much pleasure in reporting that this volume has also been a great success wherever it has found its way, and that both the late and the present Governors-General have expressed their warm approval after a personal inspection. The experiment of sending out a few reviews, or presentation copies, has proved equally encouraging. Two such copies have already exerted considerable influence over two forthcoming histories of prime importance. One is the new American History of Canada which is being written by Mr. Frank Tracy, literary editor of the Boston *Transcript*. The other is what promises to be the greatest and most authoritative "History of the United States and Its People," a magnificent work in twelve volumes, which Dr. Avery has been preparing for eighteen years, and of which the Burrows Brothers are already beginning the actual publication. Several other copies are now doing their work equally well in many influential quarters, and altogether, they cannot fail to have a far reaching effect in making this momentous turning-point in Canadian and Imperial history both better known and better understood.

We have fortunately been instrumental in helping to save the Martello Tower overlooking the St. Charles. The municipal authorities intend to use it as a police station and keep it intact. We are glad to see a strong and growing body of well-founded opinion becoming more and more alive to the need and advisability of preserving the splendid landmarks of Quebec. We do not wish for a moment to

oppose any real modern improvement in our midst; nor do we wish to have any object carefully preserved merely because it happens to be old, and irrespective of its use, beauty or historic interest, for we remember that nearly everything which is now an historic monument to us once served some useful purpose for a bygone generation of our fellow-citizens. But we shall always prevent, by every means in our power, any wanton disfigurement of Nature or destruction of these works of man which remind us of a worthy past. And to do so more effectually we would ask our own members, and all Quebecers, to remember the motto, "*Je me souviens*," and to assist the efforts of the Canadian Landmark Association as both a duty and a privilege. With such an association keeping watch and ward over all that the present only holds in trust for posterity, we should be doubly armed against every wanton attempt to level down the high and rare distinction of our most favoured city "into the catalogue of common things."

The librarian's and treasurer's reports deal fully with their own departments — but we should like to mention specially that since we have now paid off the \$475 for the new bookcases, according to our agreement with Morrin College, the whole of the college book grant of \$250 will be available for its proper purposes during the present year. Dr. Douglas' generous grant of \$500 will be divided, as before, between the book fund and the publishing of original documents.

With regard to our general financial position, we have to report that we still carry a residuary indebtedness which we shall pay off, as soon as possible, out of the realization of an investment which we are free to use at our discretion. We hope to obtain, as on former occasions, a special grant from the Provincial Government in aid of the work of publishing the documents relating to 1775. Our deputation was kindly received by the Prime Minister, who acknowledged that our work was one of national importance.

It affords us great pleasure to report that not a single member has died or resigned in 1905, that only three have left the city, and that thirty-three new members have been elected. This means an addition of thirty to our membership and of \$120 to our annual subscriptions.

We desire to publicly acknowledge the special kindness of our honorary president, Dr. James Douglas, in giving us a most interesting lecture on "*Education in Quebec in the 17th Century*" on the 26th of January, to the great delight of one of the largest and most appreciative audiences.

We would beg leave to remind our members that Quebec is to be honoured by an exceptionally brilliant gathering of *savants* from every part of the world, and by one whose specialty should appeal with peculiar force to our sympathetic interest, since it is the study of the native Indian races of America.

We desire to express an earnest hope that many of our society will take the opportunity of becoming temporary members of this International Congress of Americanists, during its session here in next September.

In conclusion, we would venture to remind our French speaking fellow-citizens that our society has always been, and still is, one in which they will find themselves most warmly welcomed; one in which many French Canadians have occupied the most distinguished position, from our foundation down to the present day; one in which they would already find several members of their own race and creed; and, finally, one in which the common intellectual interests of all Quebecers will always find a common home.

The officers for the ensuing years were then elected as follows:—
Honorary President—Dr. Jas. Douglas.

President—P. B. Casgrain, K.C.

Vice-Presidents—J. Hamilton, Dr. G. W. Parmelee, J. T. Ross,
Col. Turnbull.

Recording Secretary—A. Robertson.

Corresponding Secretary—A. H. Cook.

Council Secretary—Wm. Clint.

Treasurer—Jas. Geggie.

Librarian—F. C. Wurtele.

Curator of Museum—Rev. G. P. O'Leary.

Curator of Apparatus—G. Lampson.

Additional Members of Council—Sir J. M. LeMoine, Major Wood,
C. Tessier and S. Lesage.

X.—From *Le Cercle Littéraire et Musical de Montréal*, through
DR. HENRI M. AMI.

Le 5 novembre 1905, à notre 251ème séance, nous avons célébré le 20ème anniversaire de notre société, non sans un légitime orgueil d'avoir atteint un âge si respectable au sein d'une époque agitée et sujette aux changements. Une ombre de mélancolie planait cependant sur cette réunion, car vingt années dans une existence humaine représentent tant de choses et involontairement ceux qui ont assisté aux débuts de la société songeaient aux chers disparus et regrettaient le

passé. Mais pour le cercle même, ainsi qu'on l'exprima en termes éloquents dans plusieurs discours, c'était une date mémorable, un jour de joie et de triomphe de nature à nous encourager. Car on a parlé d'avenir et nous voulons croire à la prédiction d'un de nos orateurs lorsqu'il citait la strophe de la Marseillaise :

“ Nous entrerons dans la carrière,
Quand nos enfants n'y seront plus,” etc.,

confiant ainsi aux jeunes membres de notre cercle la tradition inaugurée il y vingt ans, sous les auspices de M. Coussirat.

Il est à constater que malgré le nombre réduit à neuf des séances de l'hiver, il y a eu recrudescence de zèle et d'enthousiasme, les sujets choisis pour la discussion générale ayant excité beaucoup d'intérêt. Outre les travaux écrits dont suit la liste, nos soirées ont été embellies par d'excellente musique, plusieurs comédies de salon, saynètes, lectures de pièces intéressantes et déclamations.

Travaux écrits.

Les Lutins, M. Honoré Beaugrand.

A L'Aquitanie, M. Coussirat.

Impressions artistiques, M. Duclos.

Le Phédon, M. Coussirat.

Berlioz, Mme Laberge.

César Franck, Mme Cornu.

Etude sur Sedaine, M. Morin.

Les Principes de la critique de E. Renan, M. Coussirat.

Le Flirt, M. Sauvalle.

La bonne et la mauvaise humeur, Mme King, M. Mage, M. Duclos.

Deux Contes de Joe Violon, M. Fréchette.

Le Golfe (poème), M. Desaulniers.

A propos de critique littéraire, M. Lafleur.

L'université en France, M. Coussirat.

L'université en Allemagne, M. Walter.

L'université en Angleterre, M. Caldwell.

Les critiques modernes — Brunetière, M. Coussirat; Jules Lemaitre, M. Walter.

A propos du merveilleux, M. Lafleur.

Les barbiers dans l'histoire, Mme Sauvalle.

Voiture et Benserade, Melle Eglauch.

Alfred de Musset, Mme Herdt.

Les grandes fortunes sont-elles utiles à l'Etat? M. Sauvalle, Melle Eglauch.

XI.—From *The Niagara Historical Society*, through
MISS JANET CARNOCHAN.

In presenting our report in this eleventh year of our existence, we feel that we are not without some work accomplished. It is true that we cannot record so many papers read as in some years, but this was because many of our meetings were occupied by business connected with our proposed Memorial Hall. There were seven regular meetings held from October to May, and besides these many committee meetings. The papers read were by the President, "The Origin of the Maple Leaf as the Emblem of Canada," "The Life and Character of Sir Isaac Brock," and "Extracts from the Letters of Mrs. Wm. Dennimer Powell." However, if fewer papers have been read, we have this year printed, besides our usual report, two pamphlets, namely, No. 13—A Canadian Heroine and St. Vincent de Paul's Church and Origin of names of streets in Niagara; also No. 14—Letters of Mrs. W. D. Powell, 1806-1821, and Account of W. D. Miller and family, and we are pleased to say there has been a fair demand for both of those.

As regards membership, we have again to record an addition of twenty, so that we now number 112; these are scattered from Quebec to Calgary, from New York and Massachusetts to Kansas City. A great impetus was given to our membership by the annual meeting of the Ontario Historical Society being held here and at Niagara Falls on the 7th and 8th June. On the first day Col. Cruikshank gave addresses which threw much light on the stirring events at Chippawa, Lundy's Lane, and Queenston Heights, and at Niagara were visited the old Forts George and Mississagua, St. Mark's and St. Andrew's churches, and the Historical Room, and, we believe, thus increased life and vigour has been given to us.

The usual visit was paid on 17th September to the graveyards to decorate with flowers. The usual grants for printing purposes have been received from the Ontario Government and County Council. The collection is increasing in number and value, there being now over three thousand articles of manuscripts, documents, books, military equipage, historical relics of many kinds; over five hundred visitors recorded their names. Pamphlets to the amount of \$15 were sold and over 700 were distributed to members, societies and others interested. A visit was paid to the room by the St. Catharines Literary and Historical Society and much interest shown. The collection was removed for the summer to the Town Hall in the same building, and in this large and commodious room the articles were displayed to much greater advantage.

In view of the threatened sale of the Military Reserve here a deputation was sent to Ottawa, consisting of members from the Ontario Historical Society and the town, to appeal against the spoliation of the ground made sacred by the blood of so many brave men in the war of 1812. A letter from Mr. Wm. Kirby to the president of our society regarding this, and one from the president were printed and distributed, and it is hoped that better counsels will prevail.

But it is in regard to our proposed Memorial Hall that we feel thankful progress has been made. The president visited Ottawa to ask for assistance, and in view of the fact that we are no longer local in our aims, but that our membership extends through the Dominion, a grant of \$1,000 was given; we now have altogether about \$3,000 promised, and plans and specifications have been decided on, a tender for \$4,000 accepted, and the foundation is now laid on a site given by the president, and we hope by September we shall be safely esconced in a very handsome building.

Officers.

Patron—Wm. Kirby, F.R.S.C.

President—Miss Carnochan.

Vice-President—Rev. J. G. Garrett.

Secretary—Alfred Ball.

Assistant Secretary—John Eckersley.

Treasurer—Mrs. S. D. Manning.

Curator and Editor—Miss Carnochan.

Committee—Mrs. T. F. Best, W. R. McClelland, C. A. F. Ball, Wm. Miller, W. J. Wright, M.A.

XII.—From *The Elgin Historical and Scientific Institute*, through
FRANK HUNT.

The past year has been marked by interest and continued effort on the part of the Women's Auxiliary, whose report is appended.

The institute arranged in October last, for a commemoration of the centennial anniversary of the Battle of Trafalgar, by requesting the mayor to notify all citizens to display flags, the ministers to make reference to the anniversary from the pulpits, and the newspapers to publish special articles on Nelson's great victory. The president, as principal of the public schools, arranged with the teachers to call attention to the anniversary. The Women's Auxiliary held a special meeting.

The institute held three meetings during the last season. **Public** lectures were delivered as follows:—

Feb. 2, 1906.—“On the French Canadian in History,” by Mr. Benjamin Sulte, F.R.S.C.

Feb. 23, 1906.—“On English Literature,” by William Wilfrid Campbell, F.R.S.C.

Your co-operation is requested in taking measures for the preservation of the Southwold earthwork and other historical and archaeological memorials.

The officers for the year 1906-7 were elected as follows:—

President—James H. Coyne.

Vice-President—Mrs. J. H. Wilson.

Secretary—Frank Hunt.

Treasurer—W. H. Murch.

Curator—Mrs. W. St. Thomas Smith.

Editor—Judge Ermatinger.

Council—Dr. S. Silcox, Judge Colter, J. W. Stewart, Charles Oakes, K. W. McKay; Mesdames J. S. Robertson, C. O. Ermatinger, T. W. Duncombe, W. R. Jackson.

XIII.—From *The Women's Historical Society of the County of Elgin*, through Mrs. R. H. McCONNELL.

During the past season there were six meetings held. The programme consisted of the following papers:—

A talk on the old “Fort” at Prescott, by Miss Ermatinger.

An address on Tecumseh the “Shawnee chief,” by Mr. Waterbury, interspersed with readings by Mrs. Kains from the drama by the same name.

“Sketches of the men of Bruce County,” by Mrs. Louisa King.

Conclusion of address on “Tecumseh,” by Mr. Waterbury.

“Canadian Senate,” by Mrs. J. H. Wilson.

“Early Women of the Country,” by Mr. Edward Harris.

“The Hudson Bay Company,” by Miss Grace McConnell.

The ladies entertained their friends at an evening party held on November 27th, 1905. On January 11th, 1906, “The Women's Historical Society,” presented a flag to the 25th Regiment for their armoury. The presentation was made by the president, Mrs. Wilson, with an appropriate address, which was cordially responded to by the commanding officers, who, later on in the evening, entertained the society at a party in honour of the occasion.

The 100th anniversary of the Battle of Trafalgar was celebrated by a special meeting at which an address suitable to the occasion was delivered by Mr. James H. Coyne, M.A.

The membership is 100—the society having passed a resolution limiting it to that number.

The society is in a good financial condition, having about \$80.00 to its credit in the Southern Loan and Savings Company.

Officers:

President—Mrs. J. H. Wilson.

1st Vice-President—Mrs. James H. Coyne.

2nd Vice-President—Mrs. J. S. Robertson.

3rd Vice-President—Mrs. Truman Duncombe.

Secretary Treasurer—Mrs. R. H. McConnell.

Assistant Treasurer—Miss McLachlan.

Assistant Secretary—Mrs. O. J. Stevenson.

Cor's Secretary—Miss Coyne.

Rep't Secretary—Miss Wegg.

Curator—Mrs. F. M. Griffin.

XIV.—*Report of the Botanical Club of Canada for 1905-6.*

By the General Secretary, A. H. MacKAY, LL.D.

Circulars and special letters were sent out to many addresses during the year, asking for co-operation in the various kinds of botanical work which the club desires to stimulate. There has been very considerable response from many quarters showing that the exploration of the local floras is receiving more than ordinary attention. But no local lists of plants extending the known range of species have been sent to the secretary except in the case of the province of Nova Scotia where several workers are more or less co-operating. However, many are publishing papers on some department of the local floras in local scientific publications, and these I have endeavoured to refer to as far as they could be kept in view, in my report of the Bibliography of Canadian botany for the year.

I have been recommending those making additions to their local lists to send such reports annually to the honorary president of the club, who, as the official biologist of the geological survey of Canada, is in the best position for collating, correcting and publishing such additions of new plants and extensions of the range of old plants.

I have been unremitting in sending out blanks for the report of local phenological observations; but have yet been unable to have a report from the Yukon or the Island of Newfoundland. As usual my correspondents are most willing to make observations when asked; but within a year after they too often find that their absorption in other occupations prevented their systematic observations to be carried on at interesting seasons, and rather than report a short list they prefer to hope to make a more complete list the following year.

Through the kindness of the director of the meteorological service of the Dominion, Mr. R. F. Stupart, I am able to give short reports of the first observance of many phenomena at as many as seventeen points over the western provinces of Canada, which stations are distinguished in the list following by an asterisk. Mr. F. F. Payne has made a list of fifty phenomena which are to a great extent common to all the provinces. But he finds that even this select list does not appear to be suitable for many localities. I join with him in asking the aid of the club in framing a general list which will as far as possible enable us to compare the climate of the east, centre and west of Canada as definitely as possible. Such a list could be included in all more comprehensive lists in black letter, to distinguish the phenomena as the specially important to be observed, in case the observer cannot conveniently take time for the

observation of a larger range. Perhaps for east and west it may be desirable to list equivalent species in juxtaposition. It may here be stated, that some of the western species in the tables following, are the equivalent of the eastern species—generally one of the following supplementary western list usually published in accompaniment with the original eastern list.

- a. Spring Anemone (*A. patens*, var. *N.*), Prairies, fl.
- b. Salmon berry (*Rubus spectabilis*), B. C., fl.
- c. " " " fruiting.
- d. Ash-leaved Maple (*Acer Negundo*). Ont. and W., fl.
- e. Wild Plum (*Prunus Americana*). East fl.
- f. Blackberry (*R. occidentalis* and *leuc.*) fl.
- g. " " " fruit.
- h. Western Dogwood (*Cornus Nuttallii*). B. C., fl.
- i. Oaks (Black and White), fl.
- j. Song Sparrow (*M. Montana*) arrived.
- k. Robin (*M. propinqua*). B. C., arrived.
- l. Blue Bird (*Sialia sialis*). Central, arrived.
- m. Junco (*J. annectens* and *Oregonus*). B. C.
- n. Red winged Blackbird (*Ag. phæniceus*).
- o. Meadow lark (*Sturnella neglecta*). Man.
- p. Humming-bird (*T. rufus* and *Cal.*). West.
- g. Night-hawk (*Chordeiles Henryei*). B. C.
- r. Dates and duration of drought.

The general short list of the Meteorological service referred to is the following:

- | | |
|--|-----------|
| 1. Blood Root (<i>Sanguinaria Canadensis</i>)..... | Flowering |
| 2. Hepatica (<i>Hepatica triloba</i>)..... | " |
| 3. Trailing Arbutus (<i>Epigaea repens</i>)..... | " |
| 4. Dandelion (<i>Taraxacum officinale</i>)..... | " |
| 5. Violet, Blue (<i>Viola cucullata</i>)..... | " |
| 6. Violet, White (<i>Viola blanda</i>)..... | " |
| 7. Columbine (<i>Aquilegia formosa</i>)..... | " |
| 8. Blueberry (<i>Vaccinium</i>) | " |
| 9. Red clover (<i>Trifolium pratense</i>)..... | " |
| 10. White Clover (<i>Trifolium repens</i>)..... | " |
| 11. Wild Raspberry (<i>Rubus</i>)..... | " |
| 12. Cultivated Currant (<i>Ribes rubrum</i>)..... | " |
| 13. Wild Rose (<i>Rosa lucida</i>)..... | " |

14.	Trillium (Trillium)	Flowering
15.	Anemone (Anemone patens)	"
16.	Maple (Acer)	"
17.	Strawberry, Wild (Fragaria Virginiaiana)	"
22.	Plum, Cultivated (Prunus domestica)	"
23.	Cherry, Wild (Prunus)	"
24.	Cherry, Cultivated (Prunus Cerasus)	"
25.	Buttercup (Ranunculus acris)	"
26.	Yellow Pond Lilly (Nuphar advena)	"
27.	Pitcher Plant (Sarracenia purpurea)	"
28.	Saskatoon (Amelanchier Canadensis)	"
29.	Golden Rod (Solidago)	"
30.	Geese	Migrating
31.	Ducks	"
32.	Robins	"
33.	Meadow Larks	
34.	Blue Birds	
35.	Flicker or Golden Woodpecker	
36.	Song Sparrows	
37.	Swallows	
38.	Juncos	
39.	Orioles	
40.	King Birds	
41.	Humming Birds	
42.	Frogs Piping	
43.	Earth Worm Casts (Frost out of ground)	
44.	Lakes Open	
46.	Ploughing	
47.	Sowing	
48.	Hay Cutting	
49.	Grain Cutting	
50.	Planting Potatoes	

Nova Scotian Phenochrons.

The first table contains the summary of about four hundred and fifty schedules of observations made in as many of the public schools of the province by the pupils attending school, from a radius of about two miles around each school, the observations being proven and recorded by the teacher, who transmits the schedule with the regular school return to the Inspector. The superintendent sends the schedules from specified regions of the province to the following staff of phenologists who are themselves also in the educational service. Their reports

can be found *in extenso* in the April *Journal of Education* for Nova Scotia, 1906, from pages 58 to 69. They also compile schedules showing the average dates (phenochrons) of the various phenomena for the coast belt, the low inland belt and the high land belt of each special region of the province. These schedules were compiled in their turn into the ten regions of the province shown on the said first table, by Mr. W. Kent Power, B.A. The said Nova Scotian staff is as follows:

Region	I. (Yarmouth and Digby counties), A. W. Horner. Principal, Seminary School, Yarmouth.
Region	II. (Shelburne county), C. Stanley Bruce, Shelburne Academy.
Region	II. (Queens county), Minnie C. Hewitt, Science Teacher, Lunenburg Academy.
Region	II. (Lunenburg county), Burgess McKittrick, B.A., Principal, Lunenburg Academy.
Region	III. (Kings and Annapolis counties), Ernest Robinson, Acadia College, Wolfville.
Region	IV. (Hants county and South Colchester), W. J. Shields, Principal, Hantsport High School.
Region	V. (Halifax county), G. R. Marshall, B.A., Principal, Compton Avenue School, Halifax.
Region	V. (Guysboro county), J. B. McCarthy, B.A., B.Sc., Science Master, Halifax Academy.
Region	VI(A). (Cobequid Slope), J. E. Barteaux, Science Master, Truro Academy.
Region	VI(B) & VII. (Cumberland and North Colchester), E. J. Lay, Principal, Amherst Academy.
Region	VII. (Pictou county), C. L. Moore, B.A., Science Master, Pictou Academy.
Region	VII. (Antigonish county), F. G. Morehouse, King's College, Windsor.
Region	VIII. (Richmond county), G. W. McKenzie, B.A., Principal, Sydney Mines High School.
Regions	VIII, IX, and X. (Cape Breton and Inverness counties), L. A. DeWolfe, M.Sc., Truro Academy.

General Canadian Phenochrons.

The second table gives the dates of the first observance only of each phenomenon, except in the case of Nova Scotia, where the average dates of the averages of each of the ten regions is given. The observ-

ers and their stations for the other provinces are as follows, in the order of the table:

Nova Scotia, the average of about 450 localities throughout the province.

St. Stephen, New Brunswick: Mr. J. Vroom.

St. John, New Brunswick: G. U. Hay, D.Sc.

Charlottetown, Prince Edward Island: Mr. John MacSwain.

Kensington, Prince Edward Island: Mr. J. M. Duncan.

Windsor Mills, Richmond county, Quebec: Miss Annie M. Dresser.

St. Thomas, Elgin county, Ontario: Mr. George L. Fisher.

*Paris, Brant county, Ontario: Mr. John Kay.

*Birman, Lambton county, Ontario: Mr. J. S. Mellor.

*Arden, Addington county, Ontario: Mr. Thomas Andrew.

*Ursa, Peterboro county, Ontario: Mr. Stephen Kettle.

*Lakefield, Peterboro county, Ontario: Mr. H. J. Le Fevre.

Guelph, Wellington county, Ontario: Mr. A. B. Klugh.

*Orillia, Simcoe county, Ontario: Mr. C. L. Stephens.

Gravenhurst, Muskoka county, Ontario: J. H. Elliott, M.B.

*Beatrice, Muskoka county, Ontario: Mr. John Hollingworth.

*Bruce Mines, Bruce county, Ontario: Mr. John Nicholas.

*Morden, Manitoba: Miss Laura E. Bradshaw.

*Norquay, Manitoba: Mr. W. H. Holland.

*Oakbank, Manitoba: Mr. Alfred Goodridge.

*Estavan, Saskatchewan: Mr. D. R. Davies.

Mistawasis, Saskatchewan: Rev. C. W. Bryden, B.A.

*Princeton, British Columbia: Mrs. H. Hunter.

*Cowichan, British Columbia: Mr. T. M. English.

Victoria, Vancouver Island, B.C.: A. J. Pineo, B.A.

Vancouver, British Columbia: J. K. Henry, B.A.

*Rivers Inlet, British Columbia: Mr. S. Grant.

*Quesnel, British Columbia: Mr. D. H. Anderson.

*Fort St. James, British Columbia: Mr. A. C. Murray.

Members of the club are directed for the determination of species to

MR. J. M. MACOUN,

The Curator, Herbarium of the Geological Survey,

OTTAWA, CANADA.

By making duplicate sets of plants to be determined, special care to be taken in having them exact duplicates similarly numbered, one

set can be sent to the Curator who need return only the determinations by number. The specimens, if perfect, may be of value to the Herbarium collections as representing forms from different localities.

Object and Constitution of the Club.

The Botanical Club of Canada was organized by a committee of section four of the Royal Society of Canada, at its meeting in Montreal, May 29th, 1891.

The object is to promote by concerted local efforts and otherwise, the exploration of the flora of every portion of British America, to publish complete lists of the same in local papers as the work goes on, to have these lists collected and carefully examined in order to arrive at a correct knowledge of the precise character of our flora and its geographical distribution, and to carry on systematically seasonal observations on botanical phenomena.

The intention is to stimulate, with the least possible paraphernalia of constitution or rules, increased activity among botanists in each locality, to create a corps of collecting botanists wherever there may be few or none at present, to encourage the formation of field clubs, to publish lists of local flora in the local press, to conduct from year to year exact phenological observations, etc.; for which purposes the secretaries for the provinces may appoint secretaries for counties or districts, who will be expected, in like manner, to transmit the same impetus to as many as possible in their more local spheres of action.

Members and secretaries, while carrying out plans of operation which they may find to be promising of success in their particular districts, will report as frequently as convenient to the officer under whom they may be immediately acting.

Before the end of January, at the latest, reports of the work done within the various provinces during the year ended December the 31st previous, should be made by the secretaries for the provinces to the general secretary, from which the annual report to the Royal Society shall be principally compiled. By the first of January, therefore, the annual reports of county secretaries and members should be sent in to the secretaries of the province.

To cover the expenses of official printing and postage, a nominal fee of twenty-five cents per annum is expected for membership (or one dollar for five years in advance, or five dollars for life membership). Secretaries for the provinces, when remitting the amount of fees from members to the general treasurer, are authorized to deduct the necessary

expenses for provincial office work, transmitting vouchers for the same with the balance.

The names of those reporting any kind of valuable botanical work during the year will be published in the list of active members, even should the payment of fees be forgotten. All payments are credited to the current year and the future. Lapsed active membership can, therefore, be restored at any time without the payment of arrears.

FLOWERING AND OTHER PHENOCHRONS FOR EACH REGION OF THE PROVINCE OF NOVA SCOTIA, COMPILED FROM 450
PUBLIC SCHOOL OBSERVATION SCHEDULES.

APPENDIX E

CXIX

WHEN FIRST SEEN.		YEAR ENDED JULY, 1905 NOVA SCOTIA.		WHEN BECOMING COMMON.									
REGIONS.				REGIONS.									
1. Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. (S. Cumb. and Col.) South Cobequid Slope	7. North Cumb. Col., Pictou and Antig. Breton.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. and Victoria).	10. Inverness Slope to Gulf.				
Day of the year corresponding to the last day of each month.				Average for Province.									
Jan..... 31 July..... 212													
Feb..... 29 Aug..... 213													
March..... 30 Sept..... 273													
April..... 30 Oct..... 304													
May..... 31 Nov..... 334													
June..... 181 Dec..... 365													
For Leap year add one to each except January.													
99.8	100.7	102.3	105.4	109.	107.2	106.5	116.9	110.	126.	108.4	116.	106.5	110.
104.	118.6	119.5	122.	112.4	117.3	118.1	121.4	119.	130.	118.2	123.5	107.	124.2
98.5	103.5	105.6	108.	111.3	114.4	114.2	117.4	115.4	121.	110.9	120.4	109.7	113.5
119.1	129.7	126.4	125.7	132.6	130.5	130.9	126.5	128.5	132.	128.1	132.1	124.4	135.4
.....
.....
118.5	123.1	124.2	124.4	128.8	126.8	127.6	136.8	132.	121.	126.3	133.3	126.8	130.3
123.	128.1	126.3	130.	134.1	132.8	132.1	139.7	135.5	128.	131.	137.4	131.	134.7
.....
.....
124.9	127.4	125.7	126.7	133.8	130.7	129.9	141.2	134.7	.....	130.5	136.2	130.5	133.6
122.3	124.7	122.	127.3	131.7	126.8	128.5	136.6	134.1	132.5	128.6	138.7	134.1	135.4
161.	163.4	164.1	164.8	171.3	167.1	167.7	175.3	173.8	174.5	168.3	176.7	171.3	174.4
126.5	131.5	127.9	131.3	136.6	134.1	135.2	142.2	136.6	138.5	134.	141.5	137.9	138.9

FLOWERING AND OTHER PHENOCHRONS FOR THE PROVINCE OF NOVA SCOTIA.—(Continued).

WHEN FIRST SEEN.		WHEN BECOMING COMMON.	
REGIONS.		REGIONS.	
YEAR ENDED JULY, 1905.		NOVA SCOTIA.	
		Day of the year corresponding to the last day of each month.	
		Average for Province.	
		For Leap year add one to each except January.	
1. Yarmouth and Digby.	149.5	136.9	146.2
2. Shelburne, Queens and Lunenburg.	131.8	130.5	142.7
3. Annapolis and Kings.	125.	127.8	137.5
4. Hants and South Colchester.	138.3	140.7	139.2
5. Halifax and Guysboro.	140.7	144.4	131.
6. South Cobequid Slope (S. Cumb. and Col.).	138.3	140.7	142.5
7. North Cumb. Col., Pictou and Antlg. Breton.	140.7	144.4	131.
8. Richmond and Cape Breton.	140.7	144.4	131.
9. Bras d'Or Slope (Inv. and Victoria).	140.7	144.4	131.
10. Inverness Slope to Gulf.	140.7	144.4	131.
1. Yarmouth and Digby.	149.5	136.9	146.2
2. Shelburne, Queens and Lunenburg.	131.8	130.5	142.7
3. Annapolis and Kings.	125.	127.8	137.5
4. Hants and South Colchester.	138.3	140.7	139.2
5. Halifax and Guysboro.	140.7	144.4	131.
6. South Cobequid Slope (S. Cumb. and Col.).	138.3	140.7	142.5
7. North Cumb. Col., Pictou and Antlg. Breton.	140.7	144.4	131.
8. Richmond and Cape Breton.	140.7	144.4	131.
9. Bras d'Or Slope (Inv. and Victoria).	140.7	144.4	131.
10. Inverness Slope to Gulf.	140.7	144.4	131.
1. Yarmouth and Digby.	149.5	136.9	146.2
2. Shelburne, Queens and Lunenburg.	131.8	130.5	142.7
3. Annapolis and Kings.	125.	127.8	137.5
4. Hants and South Colchester.	138.3	140.7	139.2
5. Halifax and Guysboro.	140.7	144.4	131.
6. South Cobequid Slope (S. Cumb. and Col.).	138.3	140.7	142.5
7. North Cumb. Col., Pictou and Antlg. Breton.	140.7	144.4	131.
8. Richmond and Cape Breton.	140.7	144.4	131.
9. Bras d'Or Slope (Inv. and Victoria).	140.7	144.4	131.
10. Inverness Slope to Gulf.	140.7	144.4	131.

BY COVERING AND OTHER PHENOCHRONS FOR THE PROVINCE OF NOVA SCOTIA.—(Continued).

APPENDIX E

CX XI

WHEN FIRST SEEN.										YEAR ENDED JULY, 1905.		WHEN BECOMING COMMON.												
REGIONS.										NOVA SCOTIA.		REGIONS.												
										Day of the year corresponding to the last day of each month.														
										For Leap year add one to each except January.														
1. Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. South Cobequid Slope (S. Cumb. and Col.)	7. North Cumb. Col., Pictou and Antig. Breton.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. and Victoria).	10. Inverness Slope to Gulf.	Average for Province.	Jan. 31	July 212	27	Cornus Canadensis	158.2	154.9	157.1	155.1	100.8	157.2	157.4	164.8	163.6	155.
46.7	150.0	150.7	150.3	152.5	150.9	151.7	159.	156.7	152.	152.	28	"	fruit ripe....	207.6	154.	223.8	207.	238	170.0	243.	.....	218.	.....	.....
46.6	147.8	148.5	148.6	154.1	148.7	150.2	159.	163.6	155.	152.2	29	Trientalis Americana	157.7	152.	156.6	153.9	154.	161.	153.7	156.5	163.2	166.5	160.	.....
150.4	155.6	151.5	151.4	159.3	154.3	156.2	157.7	156.5	140.	153.3	30	Clintonia borealis	159.2	158.2	161.1	157.6	158.3	164.7	160.5	160.8	161.8	161.	148.	.....
.....	156.1	157.	154.	.....	166.	165.2	163.	165.	.....	100.9	31	Calla palustris.	167.	.....	164.3	166.	159.	.....	175.	168.6	164.	172.	.....	.....
152.6	156.	157.8	152.5	159.8	158.5	155.9	165.7	167.5	.....	158.5	32	Cypripedium acule.	164.4	157.6	163.	163.8	156.1	167.3	165.5	162.1	171.8	172.5	.....	.....
159.5	160.8	159.4	158.5	167.9	165.5	164.6	166.8	169.6	158.	103.1	33	Sisyrinchium angustifolium.	169.3	163.	167.9	165.8	166.	175.6	171.1	169.9	172.5	174.2	167.	.....
161.4	164.	165.6	164.8	172.1	166.7	165.3	169.8	174.7	.....	167.2	34	Linnaea borealis	172.6	169.2	170.9	169.6	172.3	178.	171.3	172.1	175.1	175.	.....	.....
147.1	151.7	150.	158.6	154.9	154.9	159.6	157.6	153.	153.	153.8	35	Kalmia glauca	158.6	155.8	158.5	154.7	162.	156.1	160.5	164.1	162.3	156.	.....	.....
158.6	170.5	169.4	170.7	166.7	176.7	169.6	175.0	175.5	178.	172.1	36	Kalmia angustifolia	175.	171.6	175.3	173.7	175.3	170.1	.....	175.	178.3	180.5	.....	.....
172.3	158.5	.....	159.9	165.7	165.	160.5	170.6	170.	.....	165.3	37	Crataegus oxyacantha	170.3	175.8	164.8	.....	166.2	172.6	170.7	163.9	173.7	175.	.....	.....
166.1	162.4	158.6	152.	168.1	167.5	161.2	171.8	168.5	166.	164.2	38	Crataegus coccinea, etc	169.1	169.5	168.9	162.5	161.	171.3	171.	166.	176.4	173.2	171.	.....
167.1	167.7	169.7	170.3	173.8	171.	170.9	176.5	176.	173.	171.6	39	Iris versicolor	176.2	172.7	173.5	175.8	176.2	178.3	175.5	176.1	178.6	180.1	175.	.....
165.4	163.2	163.6	163.4	171.6	168.4	160.5	175.5	173.7	172.	167.7	40	Chrysanthemum Leucanth	173.8	171.7	170.	171.7	177.5	175.4	169.9	177.6	178.3	176.	.....	.....

FLOWERING AND OTHER PHENOCHRONS FOR THE PROVINCE OF NOVA SCOTIA.—(Continued).

WHEN FIRST SEEN.										WHEN BECOMING COMMON.														
REGIONS.										REGIONS.														
YEAR ENDED JULY, 1905.										NOVA SCOTIA.														
Day of the year corresponding to the last day of each month.										Average for Province.														
For Leap year add one to each except January.										Average for Province.														
1	Yarmouth and Digby.	2	Shelburne, Queens and Lunenburg.	3	Annapolis and Kings.	4	Hants and South Colchester.	5	Halifax and Guysboro.	6	(S. Cumb. and Col.)	7	North Cumb., Col., Pictou and Antig.	8	Richmond and Cape Breton.	9	Bras d'Or Slope (Inv. and Victoria).	10	Inverness Slope to Gulf.					
168.4	162.7	162.3	160.5	165.1	165.5	161.1	165.5	171.3	170.1	166.2	41	Nuphar advena	172.4	171.4	170.1	171.2	169.9	173.2	172.5	171.4	177.1	155.1		
164.6	165.6	166.5	162.9	159.5	165.5	160.5	167.6	168.5	149.1	163.1	42	Rubus strigosus	169.1	170.1	171.1	172.4	171.4	167.9	172.5	166.7	171.9	171.1	155.1	
197.2	197.2	207.1	207.1	201.1	201.1	210.5	178.5	178.5	175.3	203.9	43	" fruit ripe	214.8	203.2	203.2	217.1	207.1	232.1	232.1	232.1	215.1	215.1	175.1	
171.2	176.4	169.5	173.1	171.5	175.6	187.1	178.5	175.3	175.3	175.3	44	Rhinanthus Crista-galli	179.8	176.7	179.2	174.5	179.1	175.8	176.1	178.2	173.1	173.1	180.1	
168.3	171.1	168.9	171.4	166.7	170.9	168.6	171.8	172.1	175.1	170.5	45	Rubus villosus	176.9	175.6	176.9	175.8	176.1	178.2	173.1	175.1	179.6	179.1	180.1	
223.1	223.1	234.5	240.1	235.5	233.5	253.1	236.6	236.6	236.6	236.6	46	" fruit ripe	247.1	235.1	236.7	246.3	260.1	236.5	242.5	273.1	273.1	273.1	180.1	
170.6	172.6	166.1	170.2	180.1	172.6	177.6	172.1	172.1	172.1	172.1	47	Sarracenia purpurea	176.1	176.3	175.5	168.1	172.1	180.3	181.5	179.1	179.1	179.1	180.1	
178.1	173.9	174.1	169.1	172.2	176.1	175.1	184.1	183.1	176.1	176.1	48	Brunella vulgaris	178.7	177.9	178.1	182.5	180.2	183.3	185.2	178.1	182.1	185.1	179.1	
173.1	177.4	172.9	176.1	175.6	173.1	174.2	185.5	175.9	175.9	175.9	49	Rosa lucida	181.9	179.1	182.5	180.2	183.3	185.2	178.1	182.5	185.1	185.1	179.1	
167.1	168.2	169.1	167.5	172.8	171.4	169.9	174.5	175.3	170.5	170.5	50	Leontodon autumnale	175.5	170.6	174.2	175.4	175.6	178.4	175.5	175.7	176.1	179.1	175.1	
187.6	166.5	172.5	174.1	174.1	174.1	174.1	194.1	180.1	169.1	169.1	51	Linaria vulgaris	182.5	197.1	197.1	174.1	178.1	176.1	175.1	175.1	195.1	195.1	175.1	
133.1	140.4	133.4	135.9	141.6	143.1	139.1	145.1	144.6	139.5	139.5	52	Trees appear green	149.1	145.7	148.2	146.4	145.9	153.1	148.8	146.8	155.2	152.1	152.1	151.1
140.4	143.3	141.7	141.3	146.1	146.9	145.8	150.8	152.1	145.1	145.1	53	Ribes rubrum(cultivated)	150.9	144.1	149.1	145.9	147.2	152.2	151.9	151.6	158.6	157.9	151.1	
192.5	192.5	197.1	206.1	178.1	201.1	194.9	194.9	194.9	194.9	194.9	54	" (fruit ripe)	207.4	203.5	203.5	201.1	219.1	206.1	206.1	206.1	206.1	206.1	206.1	151.1

FLOWERING AND OTHER PHENOCHRONS FOR THE PROVINCE OF NOVA SCOTIA.—(Continued).

APPENDIX E

CXXXIII

WHEN FIRST SEEN.		WHEN BECOMING COMMON.	
REGIONS.		REGIONS.	
NOVA SCOTIA.			
YEAR ENDED JULY, 1905.			
Day of the year corresponding to the last day of each month.		Average for Province.	
Jan. 31	July. 212	153.3	151.
Feb. 59	Aug. 243	155.3	147.9
March. 90	Sept. 273	157.4	150.6
April. 120	Oct. 304	158.2	151.7
May. 151	Nov. 334	161.7	156.9
June. 181	Dec. 365	170.3	168.7
For Leap year add one to each except January.		167.8	161.9
55	R. nigrum (cultivated)	147.3	142.9
56	" (fruit ripe)	207.5	211.5
57	Prunus Cerasus	152.1	145.
58	" " fruit ripe	199.1	196.7
59	Prunus domestica	152.5	142.6
60	Pyrus malus	154.6	148.1
61	Syringa vulgaris	163.	160.8
62	Trifolium repens	158.5	150.2
63	Trifolium pratense	160.1	147.6
64	Phleum pratense	174.7	181.
65	Solanum tuberosum	187.7	177.3
66	Ploughing (first of season)	116.4	100.2
67	Sowing " "	127.3	113.6
68	Potato-planting (first of season)	126.	110.9
1. Yarmouth and Digby.		142.9	146.9
2. Shelburne, Queens and Lunenburg.		211.5	211.5
3. Annapolis and Kings.		202.	147.6
4. Hants and South Colchester.		147.6	145.8
5. Halifax and Guysboro.		206.5	149.8
6. South Cobequid Slope (S. Cumb. and Col.)		154.	155.9
7. North Cumb. Col., Pictou and Antig.		159.2	159.2
8. Richmond and Cape Breton.		210.	159.2
9. Bras d'Or Slope (Inv. and Victoria).		161.1	161.1
10. Inverness Slope to Gulf.		146.	152.5

FLOWERING AND OTHER PHENOCHRONS FOR THE PROVINCE OF NOVA SCOTIA.—(Continued).

WHEN FIRST SEEN.		YEAR ENDED JULY, 1905.		WHEN BECOMING COMMON.									
REGIONS.		NOVA SCOTIA.		REGIONS.									
1. Yarmouth and Digby.	2. Shelburne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. South Cobequid Slope (S. Cumb. and Col.)	7. North Cumb. Col., Pictou and Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. and Victoria).	10. Inverness Slope to Gulf.				
Day of the year corresponding to the last day of each month.													
Jan..... 31 July .....212													
Feb..... 59 Aug. ....243													
March..... 90 Sept. ....273													
April..... 120 Oct. ....304													
May..... 151 Nov. ....334													
June..... 181 Dec. ....365													
For Leap year add one to each except January.													
Average for Province.													
140.8	131.5	128.2	127.5	140.2	129.4	141.1	130.5	125.1	136.	133.	69 Sheep-shearing (first of season)		
183.3	192.8	.....	193.2	185.	202.5	204.4	215.	208.	210.	199.3	70 Hay-cutting	
240.5	237.4	236.6	243.	251.	236.2	227.7	247.3	242.5	232.	239.4	71 Grain-cutting		
253.8	262.8	264.1	265.9	264.	258.6	272.8	271.6	267.5	268.	264.9	72 Potato-digging		
83.3	88.9	83.5	85.9	96.5	90.6	92.7	96.7	99.	100.	91.7	73a Opening of rivers.		
94.4	102.9	.....	105.5	120.3	103.3	107.6	116.1	118.	124.	110.2	73b Opening of lakes	
104.4	108.4	114.3	115.9	117.4	121.3	120.1	112.9	122.9	130.	116.8	74a Last snow to whiten ground		
114.1	114.8	122.2	128.	120.7	129.2	129.6	127.2	129.	131.	124.6	74b " to fly in air.		
156.7	148.4	128.	133.	149.2	158.4	150.5	137.3	146.5	.....	145.5	75a Last spring frost—hard	
158.2	159.2	155.5	157.5	167.6	164.6	164.3	160.6	169.8	164.5	162.2	75b " " hoar.		
100.	102.6	85.9	111.	116.5	106.3	100.9	99.	87.	133.	104.2	76a Water in streams—high.		
.....	189.	.....	.....	277.	199.	192.	244.	.....	.....	220.2	76b " " low.
267.4	246.8	249.3	249.	240.7	253.7	262.6	257.5	260.	.....	253.7	77a First autumn frost—hoar	
285.8	279.8	278.5	288.2	277.4	272.4	274.	296.9	284.5	.....	282.	77b " " hard.	

APPENDIX E

CX·XV

[illegible]

THUNDERSTORMS—PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1904.

The indices indicate the number of stations from which the Thunderstorms were reported on the day of the year specified.

OBSERVATION STATIONS.

1. Yarmouth and Digby.	2. Shelb'ne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. S. Cobequid Slope (S. Cuni. & Col.)	7. North Cuni., Col., Pictou & Antigonish.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.	Province of Nova Scotia. YEAR. 1904.
285	293			297 298 309		297 ⁹ 298 317		297 298 301		285 293 297 ¹¹ 298 ³ 301 309 317 318 325 326 ² 335 355 360

YEAR 1905.

64						67				64
78										67
84										78
94										84
95 ¹⁵	95 ³⁴ 96 ⁴	95 ¹⁵	95 ²	95 ⁴		95 ² 96 ² 104				94 957 ² 66 ⁵ 104 109 110 114 115 116 ² 117 118 120 121 ⁶⁰ 122 ⁵ 123 ¹⁵ 124 ³ 126 ⁶ 127 ⁶¹ 128 129 ¹⁷ 130 131 132 133 134 136 ³ 137 ⁷ 138 ⁶⁰ 139 ²
					109					66
			110							104
	114 115									109
	117				118	120 121 ³⁰ 122 ² 123 ²	121 ⁸ 122	121		110
		121	121 ⁴	121 ¹² 122	121 ³					114
123 ⁷	123 ⁵		123			126 127 ³	127			115
124	124 ²		126							116 ²
126	126 ³		127		127 ⁶				116	117
127 ¹¹	127 ²⁵	127 ¹⁴							121	118
128										120
129 ⁴	129			129 ³			129 ⁸	129 ³		121
		130								122
						131 132				123
					133					124
	136 ³					134				125
			137 138 ⁶ 139		138 ²⁰	137 ⁶ 138 ² 139		138 ²	138	126
138 ⁹		138 ¹⁷					138 ³			127

THUNDERSTORMS—PHENOLOGICAL OBSERVATIONS, NOVA SCOTIA, 1905.

The indices indicate the number of stations from which the Thunderstorms were reported on the day of the year specified.

OBSERVATION STATIONS.

1. Yarmouth and Digby.	2. Shelb'ne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. S. Cobequid Slope (S. Cum.-& Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton.	Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.	Province of Nova Scotia. YEAR 1905.
.....	.....	.....	.....	140	.....	140 ²	.....	140	.....	140 ⁴
.....	.....	.....	.....	.....	141	141	.....	.....	.....	141 ²
.....	.....	.....	.....	.....	.....	142	.....	.....	.....	142
.....	.....	.....	.....	.....	.....	147 ²	.....	.....	.....	147 ²
.....	148 ¹⁵	.....	.....	148 ⁸	148	148 ⁴²	.....	.....	.....	148 ⁶⁶
.....	.....	.....	.....	149	149 ²	149 ¹¹	149	.....	.....	149 ¹⁵
.....	.....	.....	.....	150	.....	.....	.....	.....	.....	150
.....	.....	.....	.....	.....	152	.....	.....	.....	.....	152
.....	153	153	153	153 ²	.....	153 ³	.....	.....	.....	153 ⁸
.....	154 ²	.....	.....	154 ⁶	.....	154	.....	.....	.....	154 ⁹
.....	.....	.....	155 ²	.....	.....	155	.....	.....	.....	155 ³
.....	156 ²	.....	156	156	.....	156	.....	.....	.....	156 ⁵
157 ¹⁵	157 ⁴¹	157 ⁵	157 ⁴	157 ⁷	.....	157 ²	.....	.....	.....	157 ⁷⁴
158	.....	.....	.....	.....	.....	.....	.....	.....	.....	158
159	.....	159	.....	.....	.....	.....	.....	.....	.....	159 ²
.....	.....	.....	.....	.....	.....	161	.....	.....	.....	161
.....	.....	.....	162	.....	162	162	.....	.....	.....	162 ³
.....	.....	163 ²	.....	163	.....	.....	.....	.....	.....	163 ³
164	.....	164 ²	.....	.....	.....	164	.....	.....	.....	164 ⁴
.....	165	.....	165	.....	.....	165	.....	.....	.....	165 ³
.....	.....	.....	.....	.....	.....	166	.....	.....	.....	166
.....	167	.....	.....	.....	.....	.....	.....	.....	.....	167
.....	168 ¹⁴	.....	168 ⁴	168 ⁵	168 ⁴	168 ⁴⁰	.....	.....	.....	168 ⁶⁷
.....	.....	.....	.....	.....	.....	169 ⁶	.....	.....	.....	169 ⁶
.....	.....	.....	.....	170	.....	.....	.....	.....	.....	170
.....	.....	.....	.....	.....	.....	.....	172	.....	.....	172
.....	.....	.....	.....	.....	.....	173	.....	.....	.....	173
174	.....	.....	.....	.....	.....	.....	.....	.....	.....	174
.....	175	.....	.....	.....	.....	.....	.....	.....	.....	175
176 ⁹	176 ⁴	176 ⁵	176	176	.....	176 ²	.....	.....	.....	176 ²²
177 ⁷	177 ³⁸	177 ⁶	.....	177 ²	.....	177 ⁵	.....	.....	.....	177 ⁵⁸
178 ⁷	178 ⁴	178 ³	.....	178 ⁷	.....	178	.....	.....	.....	178 ²²
.....	.....	.....	.....	.....	.....	179	.....	.....	.....	179
180 ³	180	.....	.....	.....	.....	.....	.....	.....	.....	180 ⁴

PHENOLOGICAL OBSERVATIONS, CANADA, 1905.

" WHEN FIRST SEEN."

OBSERVATION STATIONS.

Number	Day of the year 1905 corresponding to the last day of each month.		Average dates for Nova Scotia	St. Stephen, N.B.	St. John, N.B.	Charlottetown, P.E.I.	Kensington, P.E.I.	Windsor Mills, Que.	St. Thomas, Ont.	Paris, Ont.	Birman, Ont.
	Jan.....	July.....									
	Feb.....	Aug.....									
	March.....	Sept.....									
	April.....	Oct.....									
	May.....	Nov.....									
	June.....	Dec.....									
	For Leap Year add one to each except January.										
1	<i>Alnus incana</i> , Willd.....		108.4	99	104	118	.....	125	.....	.....	.....
2	<i>Populus tremuloides</i>		118.2	.....	122	124	123	126	.....	.....	.....
3	<i>Epigaea repens</i> , L.		110.9	113	118	118	112	.....	.....	.....	.....
4	<i>Equisetum arvense</i>		128.1	.....	.....	.....	134	.....	.....	.....	.....
5	<i>Sanguinaria Canadensis</i>		128.6	.....	142	.....	.....	.....	99	.....	110
6	<i>Viola blanda</i>		126.3	120	126	.....	132	128	123	114	114
7	<i>Viola palmata</i> , <i>cucullata</i>		131.	.....	134	.....	132	119	130	114	120
8	<i>Hepatica triloba</i> , 'etc.		140.1	.....	118	.....	.....	126	100	.....	.....
9	<i>Acer rubrum</i>		130.5	.....	126	134	135	125	.....	.....	95
10	<i>Fragaria Virginiana</i>		128.6	.....	126	143	115	128	.....	.....	135
11	" " (fruitripe).....		168.3	.....	162	.....	151	155	.....	199	.....
12	<i>Taraxacum officinale</i>		134.	.....	134	142	138	128	.....	91	116
13	<i>Erythronium Americanum</i>		139.5	.....	142	.....	.....	118	115	.....	.....
14	<i>Coptis trifolia</i>		137.5	.....	.....	.....	144	120	.....	.....	.....
15	<i>Claytonia Caroliniana</i>		131.4	.....	.....	.....	.....	111	106	.....	.....
16	<i>Nepeta Glechoma</i>		140.4	.....	.....	.....	.....	.....	.....	.....	.....
17	<i>Amelanchier Canadensis</i>		143.6	.....	.....	.....	141	.....	130	.....	.....
18	" " (fruitripe).....		194.3	.....	.....	.....	.....	.....	177	.....	.....
19	<i>Prunus Pennsylvanica</i>		147.5	.....	149	.....	.....	135	.....	.....	130
20	" " (fruit ripe).....		208.5	.....	.....	.....	.....	.....	.....	.....	.....
21	<i>Vaccinium Can. and Penn.</i>		146.8	.....	142	.....	.....	.....	.....	191	.....
22	" " (fruit ripe).....		205.4	.....	.....	.....	.....	.....	.....	.....	.....
23	<i>Ranunculus acris</i>		152.4	.....	.....	170	167	149	.....	133	127
24	<i>R. repens</i>		158.7	.....	.....	.....	.....	144	.....	.....	.....
25	<i>Trillium erythrocarpum</i>		146.1	148	134	.....	176	127	135	.....	.....
26	<i>Rhododendron Rhodora</i>		148.	148	.....	.....	.....	.....	.....	.....	.....
27	<i>Cornus Canadensis</i>		152.	.....	.....	.....	158	.....	.....	.....	.....
28	" " (fruitripe).....		205.6	.....	.....	.....	.....	.....	.....	.....	.....
29	<i>Trientalis Americana</i>		152.2	.....	.....	.....	.....	127	.....	.....	.....
30	<i>Clintonia borealis</i>		153.3	.....	.....	.....	.....	.....	.....	.....	.....
31	<i>Galla palustris</i>		160.9	.....	.....	.....	132	.....	.....	.....	.....
32	<i>Cypripedium acaule</i>		158.6	.....	.....	.....	.....	.....	.....	.....	.....
33	<i>Sisyrinchium angustifolium</i>		163.1	.....	.....	.....	.....	151	151	.....	.....

APPENDIX E

CXXXI

PHENOLOGICAL OBSERVATIONS, CANADA, 1905.

"WHEN FIRST SEEN."

OBSERVATION STATIONS.

Number	Day of the year 1905 corresponding to the last day of each month.		Average dates for Nova Scotia.	St. Stephen, N.B.	*St. John, N.B.	Charlottetown, P.E.I.	Kensington, P.E.I.	Windsor Mills, Que.	St. Thomas, Ont.	Paris, Ont.	Briman, Ont.
	Jan..... 31	July..... 212									
	Feb..... 59	Aug..... 242									
	March..... 90	Sept..... 273									
	April..... 120	Oct..... 304									
	May..... 151	Nov..... 334									
	June..... 181	Dec..... 365									
	For Leap Year add one to each except January.										
34	<i>Linnaea borealis</i>		167.2					118			
35	<i>Kalmia glauca</i>		153.8								
36	<i>Kalmia angustifolia</i>		172.1				167				
37	<i>Cratægus Oxyacantha</i>		165.3			170					
38	<i>Cratægus coccinea</i> , etc.....		164.2			167					
39	<i>Iris versicolor</i>		171.6					178			
40	<i>Chrysanthemum Leucanthemum</i>		167.7								
41	<i>Nuphar advena</i>		166.2							179	163
42	<i>Rubus strigosus</i>		163.				162	134			144
43	" " (fruit ripe).....		203.9								
44	<i>Rhinanthus Crista-galli</i>		175.3								
45	<i>Rubus villosus</i>		170.5								
46	" " (fruit ripe).....		236.6								
47	<i>Sarracenia purpurea</i>		172.7								
48	<i>Brunella vulgaris</i>		176.7								
49	<i>Rosa lucida</i>		175.9					171		217	166
50	<i>Leontodon autumnale</i>		170.5								
51	<i>Linaria vulgaris</i>		169.1						201		
52	Trees appear green		139.1		142	147		130			
53	<i>Ribes rubrum</i> (cultivated).....		145.3					136			139
54	" " (fruit ripe).....		194.9							219	
55	<i>R. nigrum</i> (cultivated).....		147.3				156	132			
56	" " (fruit ripe).....		207.5								
57	<i>Prunus Cerasus</i>		152.1			156	157	135			126
58	" " (fruit ripe).....		199.1							182	
59	<i>Prunus domestica</i>		152.5					135			125
60	<i>Pyrus malus</i>		154.6			162	164	146			137
61	<i>Syringa vulgaris</i>		163.		165	165	165	151		141	134
62	<i>Trifolium repens</i>		158.5					136		191	169
63	<i>Trifolium pratense</i>		160.1				182	156			167
64	<i>Phleum pratense</i>		174.7				192				
65	<i>Solanum tuberosum</i>		187.7								
66	Ploughing (first of season).....		116.4		117			111		89	87

APPENDIX E

CXXXIII

PHENOLOGICAL OBSERVATIONS, CANADA, 1905.

"WHEN FIRST SEEN."

OBSERVATION STATIONS.

Number	Day of the year 1905 corresponding to the last day of each month.		Average dates for Nova Scotia.	St. Stephen, N.B.	St. John, N.B.	Charlottetown, P.E.I.	Kensington, P.E.I.	Windsor Mills, Que.	St. Thomas Ont.	Paris, Ont.	Birman, Ont.
	Jan. 31	July. 212									
	Feb. 59	Aug. 243									
	March 90	Sept. 273									
	April. 120	Oct. 304									
	May 151	Nov. 334									
	June 181	Dec. 365									
	For Leap Year add one to each except January.										
91	Zonotrichia alba, North		119.4	120	.....	.....	.....	.....	.....	.....	.....
92	Trochilus colubris "		144.7	.....	.....	.....	.....	145	120	130	135
93	Tyrannus Carolinensis "		140.5	.....	.....	.....	.....	.....	.....	.....	131
94	Dolychonyx oryzivorus "		138.2	.....	.....	.....	.....	133	.....	.....	.....
95	Spinis tristis "		140.8	147	.....	.....	.....	.....	.....	.....	.....
96	Setophaga ruticilla "		134.6	148	.....	.....	.....	.....	.....	.....	.....
97	Ampelis cedrorum "		145.2	.....	.....	.....	.....	.....	.....	.....	.....
98	Chordeiles Virginianus "		129.5	.....	.....	162	.....	.....	.....	.....	.....
99	First piping of frogs.....		110.5	.....	.....	119	120	105	.....	91	86
100	First appearance of snakes.....		114.3	.....	.....	.....	.....	119	.....	.....	.....

APPENDIX E

CXXXV

PHENOLOGICAL OBSERVATIONS, CANADA, 1905.

"WHEN FIRST SEEN."

OBSERVATION STATIONS.

Number	Day of the year 1905 corresponding to the last day of each month.		Average dates for Nova Scotia.	Arden, O.	Ursa, O.	Lakefield, O.	Guelph, O.	Orillia, O.	Gravenhurst, O.	Beatrice, O.	Bruce Mines, O.	Morden, Man.	Norquay, Man.
	Jan..... 31	July..... 212											
	Feb..... 59	Aug..... 243											
	March..... 90	Sept..... 273											
	April..... 120	Oct..... 304											
	May..... 151	Nov..... 334											
	June..... 181	Dec..... 365											
	For Leap Year add one to each except January.												
34	Linnaea borealis.....		167.2										
35	Kalmia glauca.....		153.8										
36	Kalmia angustifolia.....		172.1										
37	Crataegus oxyacantha.....		165.3										
38	Crataegus coccinea, etc.....		194.2										
39	Iris versicolor.....		171.6										
40	Chrysanthemum Leucanthemum.....		167.7										
41	Nuphar advena.....		166.2										
42	Rubus strigosus.....		163.		165				144	170			166
53	" " fruit ripe.....		203.9										
44	Rhinanthus Crista-galli.....		175.3										
45	Rubus villosus.....		170.5										
46	" " fruit ripe.....		236.6										
47	Sarracenia purpurea.....		172.7										
48	Brunella vulgaris.....		176.1										
49	Rosa lucida.....		175.9		167	170							161
50	Leontodon autumnale.....		170.5										
51	Linaria vulgaris.....		169.1										
52	Trees appear green.....		139.5										
53	Ribes rubrum (cultivated).....		145.3		138	166		133		136		167	
54	" " (fruit ripe).....		194.9										
55	R. nigrum (cultivated).....		147.3										
56	" (fruit ripe).....		207.5										
57	Prunus Cerasus.....		152.1										
58	" " fruit ripe.....		199.1										
59	Prunus domestica.....		152.5	135	136	137		147		140			142
60	Pyrus malus.....		154.6	143		144		148					
61	Syringa vulgaris.....		163.	147	150	146		154		155			152
62	Trifolium repens.....		158.5	161	167	162			159			164	152
63	Trifolium pratense.....		160.1	159	167	162			166				
64	Phleum pratense.....		174.7										
65	Solanum tuberosum.....		187.7										
66	Ploughing (first of season).....		116.4	101		98				98		84	115

PHENOLOGICAL OBSERVATIONS, CANADA, 1905.

"WHEN FIRST SEEN."

OBSERVATION STATIONS.

Number	Day of the year 1905 corresponding to the last day of each month.		Average date for Nova Scotia.	Arden, O.	Ursa, O.	Lakefield, O.	Guelph, O.	Orillia, O. ;	Gravenhurst, O.	Beatrice, O.	Bruce Mines, O.	Morden, Man.	Norquay, Man.
	Jan..... 31	July..... 212											
	Feb..... 59	Aug..... 243											
	March..... 90	Sept..... 273											
	April..... 120	Oct..... 304											
	May..... 151	Nov..... 334											
	June..... 181	Dec..... 365											
	For Leap Year add one to each except January.												
67	Sowing (first of season).....	127.3	125			103		96		110		96	112
68	Potato-planting ".....	126.	130			113		123		130			
69	Sheep-shearing ".....	133.											
70	Hay-cutting ".....	199.3	179							185	198	186	205
71	Grain-cutting ".....	239.4	217	220								219	234
72	Potato-digging ".....	264.9											
73a	Opening of rivers.....	91.7				79							91
73b	Opening of lakes.....	110.2	109			92		109		115	119		
74a	Last snow to whiten ground.....	116.8											
74b	" " to fly in air.....	124.6											
75a	Last spring frost—hard.....	145.5											
75b	" " hoar.....	162.2											
76a	Water in streams—high.....	104.2											
76b	" " low.....	220.2											
77a	First autumn frost—hoar.....	253.7											
77b	" " hard.....	282.											
78a	First snow to fly in air.....	294.8											
78b	" " whiten ground.....	310.1											
79a	Closing of lakes.....	336.3											
79b	" rivers.....	346.2											
81a	Wild ducks migrating, N.....	88.7	95										84
81b	" " S.....	306.2											
82a	Wild geese migrating, N.....	84.7	91	118						95	100	79	81
82b	" " S.....	319.3											
83	Melospiza fasciata, North.....	88.4	71			75	81						
84	Turdus migratorius ".....	84.4	79	82	68	77	77			84	85	85	92
85	Junco hiemalis.....	87.5				96	Res.						
86	Actitis macularia.....	127.4					118						
87	Sturnella magna.....	120.5				110	82			91		85	93
88	Ceryle alcyon.....	124.8											
89	Dendroica coronata.....	130.9					119						
90	D. aestiva.....	137.3					123						
91	Zonotrichia alba.....	119.4					95						

APPENDIX E

CXXXVII

PHENOLOGICAL OBSERVATIONS, CANADA, 1905.

"WHEN FIRST SEEN."
OBSERVATION STATIONS.

Number	Day of the year 1905 corresponding to the last day of each month.		Average date for Nova Scotia.	Arden, O.	Ursa, O.	Lakefield, O.	Guelph, O.	Orillia, O.	Gravenhurst, O.	Beatrice, O.	Bruce Mines, O.	Morden, Man.	Norquay, Man.
	For Leap Year add one to each except January.												
	Jan..... 31	July.....312											
	Feb..... 59	Aug.....243											
	March..... 90	Sept.....273											
	April.....120	Oct.....304											
	May..... 151	Nov.....334											
	June.....181	Dec.....365											
92	Trochilus colubris,	North	144.7	151	.. ..	125	137	137	.....	141	.....	...	140
93	Tyrannus Carolinensis	"	140.5	136	.....	124	125	.....	.....	.....	....	137	138
94	Dolychonyx oryzivorus	"	138.2	.....	.....	.....	125	.....	.....	.....	....	.....	.....
95	Spinis tristis	"	140.8	.....	.....	.....	Res.	.....	.....	.....	....	.....	.....
96	Septophaga ruticilla	"	134.6	.....	.....	.....	129	.....	.....	.....	....	.....	.....
97	Ampelis cedrorum	"	145.1	.....	.....	.....	117	.....	.....	.....	....	.....	.....
98	Chordeiles Virginianus	"	129.5	.....	.....	.....	144	.....	.....	.....	....	.....	.....
99	First piping of frogs.....		110.5	90	107	.....	.....	96	.....	100	110	108	97
100	First appearance, snakes.....		114.3	.....	.....	.....	.....	.....	.....	.....	....	.....	.....

PHENOLOGICAL OBSERVATIONS, CANADA, 1905.

"WHEN FIRST SEEN."

OBSERVATION STATIONS.

[illegible]

APPENDIX E

CXXXIX

PHENOLOGICAL OBSERVATIONS, CANADA, 1905.

"WHEN FIRST SEEN."

OBSERVATION STATIONS.

Number	Day of the year 1905 corresponding to the last day of each month.		Average dates for Nova Scotia.	Oakbank, Man.	Estavan, Sask.	Mistawasis, Sask.	Princeton, B.C.	Cowichan, B.C.	Victoria, B.C.	Vancouver, B.C.	Rivers Inlet, B.C.	Quebec, B.C.	Fort St. James, B.C.
	Jan..... 31	July..... 212											
	Feb..... 59	Aug..... 243											
	March..... 90	Sept..... 273											
	April..... 120	Oct..... 304											
	May..... 151	Nov..... 334											
	June..... 181	Dec..... 365											
	For Leap Year add one to each except January.												
34	<i>Linnæa borealis</i>		167.2										
35	<i>Kalmia glauca</i>		153.8										
36	<i>Kalmia angustifolia</i>		172.1										
37	<i>Cratægus oxyacantha</i>		165.3										
38	<i>Cratægus coccinea</i> , etc.....		164.2										
39	<i>Iris versicolor</i>		171.6										
40	<i>Chrysanthemum Leucanthemum</i>		167.7										
41	<i>Nuphar advena</i>		166.2					115					170
42	<i>Rubus strigosus</i>		163.		152		168	126		63			130
43	" " fruit ripe.....		203.9							140			
44	<i>Rhinanthus Cristi-galli</i>		175.3										
45	<i>Rubus villosus</i>		170.5						109	106			
4	" " fruit ripe.....		236.6										
47	<i>Sarracenia purpurea</i>		172.7										
48	<i>Brunella vulgaris</i>		176.1										
49	<i>Rosa lucida</i>		175.9	155	154		154	144		139		154	
50	<i>Leontodon autumnale</i>		170.5										
51	<i>Linaria vulgaris</i>		169.1										
52	Trees appear green.....		139.5										
53	<i>Ribes rubrum</i> , cultivated.....		145.3		116		119	84				130	
54	" " fruit ripe.....		194.9										
55	<i>R. nigrum</i> , cultivated.....		147.3										
56	" fruit ripe.....		207.5										
57	<i>Prunus Cerasus</i>		152.1					93		94			
58	" " fruit ripe.....		199.1										
59	<i>Prunus domestica</i>		152.5	131			132	97					
60	<i>Pyrus malus</i>		154.6	152			132	113		101	113	160	
61	<i>Syringa vulgaris</i>		163.					117		112		145	
62	<i>Trifolium repens</i>		158.5				153	130		125		146	
63	<i>Trifolium pratense</i>		160.1	150			164	122		129		150	154
64	<i>Phleum pratense</i>		174.7										
65	<i>Solanum tuberosum</i>		187.7										
66	Ploughing (first of season).....		116.4			96	79					72	125

ROYAL SOCIETY OF CANADA

PHENOLOGICAL OBSERVATIONS, CANADA, 1905.

“WHEN FIRST SEEN.”

OBSERVATION STATIONS.

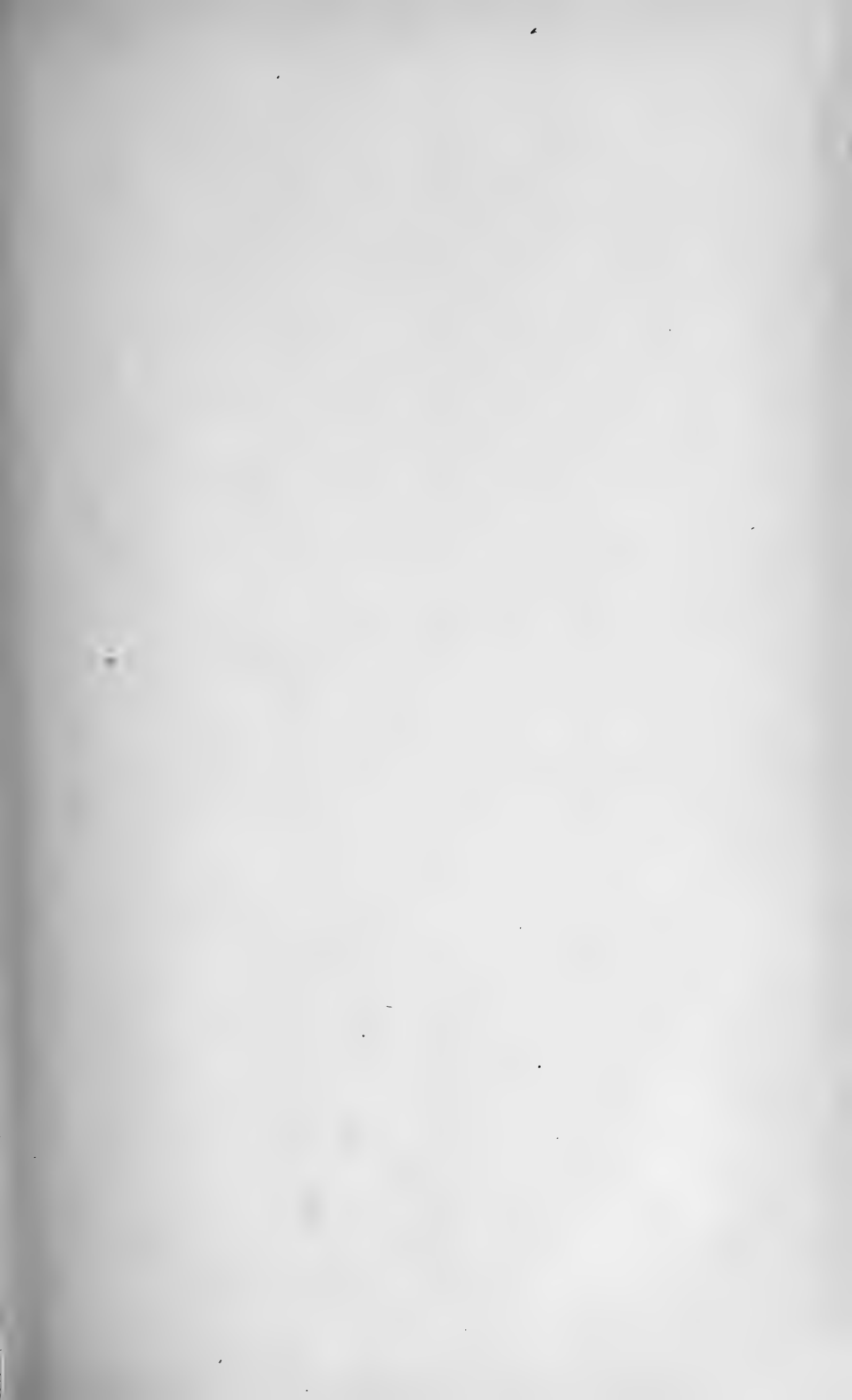
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CXLI

"WHEN FIRST SEEN."

OBSERVATION STATIONS.

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SOCIÉTÉ ROYALE DU CANADA

MEMOIRES

SECTION I.

LITTÉRATURE FRANÇAISE, HISTOIRE, ARCHÉOLOGIE, Etc

ANNÉE 1906

I.—*L'Habitation de Samos.*

Par M. P.-B. CASGRAIN.

(Lu le 23 mai 1906.)

L'évêque de Samos.—La villa de Samos.—Notes sur les personnages qui ont l'habité.—Thomas Ainslie.—Le Juge Mabane.—L'évêque Moun-tain.—L'Hon. Matthew Bell.—L'Hon. Wm. Sheppard.—La batterie de Samos, sa vraie position.—La maison et le poste de Saint-Michel.—Prise de ce poste.—Attaque manquée pour le reprendre.—Le cimetière Saint-Patrice. Bougainville retardé dans sa marche vers Québec le matin du 13 septembre 1759.

La petite localité qu'on appelait autrefois Samos n'est pas une des moins importantes, au point de vue historique, parmi celles qui environnent Québec. Quelques souvenirs rafraîchis et des détails plus précis et peu connus qui s'y rattachent et touchent aux personnages qui l'ont habitée, pourront, croyons-nous, intéresser la classe des lecteurs studieux.

Il existait à Sillery, lors du siège de Québec par Wolfe, deux maisons distinctes situées à l'ouest et non loin de l'Anse-du-Foulon, d'où ce général monta pour s'emparer des Hauteurs d'Abraham. L'une était la maison dite de Samos, qui avait servi auparavant de résidence à monseigneur Dosquet, évêque titulaire de ce nom, laquelle il s'était bâtie en 1732;—l'autre, la maison appelée Saint-Michel, sur la ferme adjacente de Messieurs les ecclésiastiques du séminaire des Missions-Etrangères établi à Québec. Elle servait de maison de récréation à leurs élèves dès avant l'année 1701. Ces deux maisons sont celles mentionnées par Franquet, ingénieur et géographe du roi, qu'il remarqua, en passant par eau devant elles, en partant de Québec, en 1752.

“Vu en passant, dit-il, à cinq ou six cents toises de la ville l'Anse-des-Mères, à un quart de lieue de celle du Foulon; à même distance plus loing une maison nommée Samod (sic) *Samos* appartenant aux prêtres du Séminaire, et tout joignant la ferme de St-Michel, et plus loin, l'endroit nommé Sillery, où est une maison de campagne appartenant aux Jésuites de cette ville.”

Le nom de Samos vulgairement donné dans le temps aux environs de la localité où la villa était construite est maintenant éteint comme lieu d'habitation et n'existe que pour désigner la partie du chemin vers le Cap-Rouge, qui passe à cet endroit. Tout en faisant l'historique de

Samos, nous allons localiser spécifiquement le site de chacune des deux maisons, au moyen de pièces probantes et authentiques qui vont nous donner une idée exacte de la situation, étendue et topographie complète des lieux, afin de les examiner ensuite à leur point de vue stratégique et fixer le site de la batterie dite de Samos; puis nous pourrions suivre les opérations militaires qui eurent lieu sur le terrain depuis le lever du jour, le 13 septembre 1759, jusqu'à le retraite de Bougainville qui termina cette mémorable journée.

En référant au contrat de vente de la terre de Samos achetée de Nicolas de la Nouiller par Mgr Dosquet, on découvre que le vendeur avait pu établir l'enchaînement de tous les titres de propriété du fond, depuis l'acte de concession primordial jusqu'à celui de sa propre acquisition en 1724.

En effet, on y constate que Jacques Pagé, orfèvre, marchand-bourgeois de Québec, par contrat du 15 janvier 1724, devant Mtre Barbel, notaire, vend à Mtre de la Nouiller, conseiller du roi au conseil supérieur et trésorier de la marine en la ville de Quebeck, " cinquante arpens en superficie de terres (prix 600 lbs., payé d'avance) situées proche des terres de la maison de Saint-Michel, appartenant à Messieurs du Séminaire des Missions-Etrangères établi à Québec, sise au lieu appelé Coulonge, joignant du côté du sud-ouest aux terres des dits Sieurs du Séminaire, un chemin de douze toises entre d'eux, d'un bout au fleuve St-Laurent et par l'autre bout au grand chemin comme l'on va de Quebeck au Cap-Rouge à main gauche, aussi douze toises de large réservées pour le dit grand chemin entre d'eux," les dits 50 arpens tels et ainsi qu'ils ont été concédés à Jean Bonnart (sic) Bouvart, dit Lafortune,¹ par Monsieur de Montmagny, alors gouverneur en ce pays, suivant titre de concession du 15 novembre 1646 et brevet de confirmation de Messieurs de l'ancienne et première compagnie en ce pays, en date du 29 mars 1649; appartenant au vendeur comme héritier de défunt le Sieur Guillaume Pagé Carcy² et Elizabeth LeTarte, ses père et mère; et au dit feu Sr Pagé Carcy appartenant par acquisition qu'il en a faite de Geneviève Gaudin, épouse en premières noces de Antoine Boutin, et de Marguerite Gaudin, femme de Robert Pagé, par contrat passé devant Mtre Louis Chambalon, notaire royal, en cette la prévosté, le 27 mai 1702; ensuite duquel contrat est une ratification et une quittance des dix et vingt-neuf juin 1702; et aux dits Gaudins appartenant comme héritiers de défunt Barthélemy Gaudin, leur père, qui les avait acquis

¹ Nommé Bonneau dit Lafortune, — *Conseil Souverain*, 1664, 8 février.

² Ce Guillaume Pagé est ancêtre maternel par sa fille, Suzanne Pagé, de Mathilde Perreault, mon épouse, dont elle est la trisaïeule, et je remonte au père de Guillaume Pagé, moi aussi, du côté maternel.

du dit Bouvard, par contrat passé devant Mtre Laurent Bermen, notaire, en date du 21 mars 1649, confirmé le 29 du même mois,— relevant de Messieurs du Séminaire comme seigneurs de la châtellenie de Coulonge.”

Chacune des pièces citées plus haut a été soigneusement compulsée par nous et confirme l'exactitude des énoncés qu'elle comporte et qui en dérivent.

On sait que l'évêque de Samos nommé coadjuteur de Québec en 1728, passa au Canada à la fin de l'été 1729, pour y prendre possession de l'évêché de Québec, en sa qualité de coadjuteur.¹

L'évêque en titre par succession était Mgr Duplessis-Mornay, de Paris, ci-devant coadjuteur et résignataire, auquel fut dévolu néanmoins l'évêché à son insu et dont il prit possession par procureur; car, vu son âge et ses infirmités, il se trouvait hors d'état de traverser les mers. Mgr Dosquet prit passage sur la flûte du roi "*L'Eléphant*" qui fit naufrage dans la nuit du 1er septembre 1729, sur les battures du Cap-Brûlé, côte nord du Saint-Laurent, à environ dix lieues en bas de Québec.

Comme avant sa nomination Mgr Dosquet avait déjà demeuré au pays pendant deux ou trois ans, en qualité de simple prêtre chez les Sulpiciens de Montréal, étant sulpicien lui-même, ses relations et sa connaissance du pays faisaient croire qu'il allait s'y fixer et s'attacherait à son diocèse, surtout après le démission de Mgr de Mornay qui fut donnée le 12 septembre 1733.

On le vit aussi, pour s'installer à son arrivée, commencer par faire réparer en partie le palais épiscopal, grand et solide édifice construit par Mgr de Saint-Vallier et demeuré vacant depuis, car ce prélat demeurait à l'Hôpital-Général. Le roi accorda alors une gratification de 3,000 livres à l'évêque de Samos, plus pour contribuer aux réparations qu'en vue de l'indemniser des pertes réclamées par lui à raison du naufrage de *l'Eléphant*; et même le roi lui permit la vente de cinq emplacements adjacents pour aider aux mêmes travaux.

On voit cependant que s'il se trouvait mal logé, et s'en plaignait, c'est qu'il le voulait bien, parce que dans une lettre de Rome de 1738, c'est-à-dire dix ans après, il dit que lors de son arrivée à Québec, il fit préparer au séminaire à ses frais un appartement destiné à l'évêque;

¹ Il y avait avant 1727, comme coadjuteur de l'évêque de Québec, Mgr. l'évêque de Euménie qui, ayant donné sa démission, avait été remplacé par l'abbé Macheco de Préméaux frère de l'évêque de Cousérans et alors grand-vicaire de l'évêque de Soissons. Il est dit homme de condition, de bonnes moeurs et de bonne doctrine—*Lettre du ministre à M. de Beauharnois, 18 mai 1728*. Ce dernier dut aussi se démettre, puisque Mgr Duplessis-Mornay apparaît ensuite finalement comme coadjuteur consacré.

puis il ajoute qu'il ne l'a pas occupé et s'est contenté d'une chambre habitable du palais épiscopal qu'il trouva fort délabré. On se demande alors pourquoi, dans ces circonstances, bâtir trois ans après, une troisième demeure à Samos, si elle ne devait pas ou ne pouvait pas, vu sa dimension, loger la nombreuse suite de l'évêque, peut-être aussi une dizaine de séminaristes qu'il avait amenés avec lui pour les former à la prétrise, et en sus sept domestiques, dont les noms nous sont conservés, composant un train de maison et un attirail de grand seigneur.

Il recherchait ses aises et se trouvant mal logé en ville, il voulut s'installer à la campagne et choisit le site à Sillery appartenant à M. de la Nouiller. Celui-ci étant dûment fondé en titre, comme on vient de le voir, vendit par contrat devant Dubreuil, notaire, en date du 17 octobre 1731, à Monseigneur illustre et révérend Père en Dieu Pierre Dosquet, évêque de Samos, *in partibus*, et coadjuteur de Québec, les mêmes 50 arpens de terre ci-dessus avec les mêmes délimitations,—“ensemble tous les bâtiments construits sur iceux et meubles qui y sont, sans aucune retenue.” Le prix stipulé est de 2,800 livres, demeurées à rente au denier vingt dans les mains de l'acquéreur. Nous verrons ce qu'il advint par la suite, tant du principal que de la rente, comme aussi de la maison qu'il y fit construire l'année suivante.

Il est vrai que Mgr de Saint-Vallier avait abandonné sa résidence du palais épiscopal qu'il avait fait bâtir à grands frais, pour se retirer à l'Hôpital-Général, mais il n'avait pas eu l'idée bizarre de le démanteler pour le plaisir de détruire, comme l'évêque Dosquet lui en prête la pensée dans sa même lettre; et de prendre de là occasion de se plaindre, dix ans après, d'avoir été mal logé à Québec, tout comme s'il voulait faire parade de son abnégation en se privant d'occuper l'appartement d'évêque tout préparé à ses frais qui l'attendait au séminaire. Cependant, malgré ses installations et constructions, Mgr Dosquet ne séjourna en tout que peu de temps en Canada; et, comme certains évêques en France, ne voulut pas s'astreindre à la résidence. Venu en 1729, il s'embarqua en 1733 pour la France; il revint l'année suivante sur le vaisseau du roi le *Rubis*, pour s'en retourner définitivement le 17 octobre 1735.

Il nous paraît clair qu'il ne dut occuper Samos que fort peu de temps. Bâtie en 1732, la maison en pierre ne pouvait guère être logeable dans l'hiver suivant, sinon, comme on dit, seulement pour essuyer les murs. D'ailleurs, les dimensions du logis n'étaient pas proportionnées à sa suite épiscopale.

Après son départ et jusqu'à 1744, on ne sait trop ce qu'il fit de cette établissement ni même qui en était le vrai propriétaire (en loi). N'en ayant pas payé le prix d'achat, il semble ne s'être pas plus occupé

du paiement de la rente de 140 livres que du sort principal. Il aurait fait, assure-t-on, une donation verbale de la terre et maison au séminaire avant son départ, en octobre 1735; toutefois, il manifesta son intention de les retenir, suivant sa lettre de Paris du 1er juin 1736. Cette donation ne présentant aucune date ou titre écrit, ne pouvait légalement transférer aucun droit de propriété, en sorte que celui-ci parut demeurer comme en suspens.

Cependant les Messieurs du séminaire, se croyant bien fondés en fait, prirent le moyen d'en finir, et au bout de neuf ans ils payèrent le prix le vente de 2,800 livres dû à La Nouiller, lequel reconnut l'avoir reçu "du séminaire comme étant aux lieu et place et droits de Monseigneur Pierre Herman Dosquet, ancien évêque de Québec, à cause de la donation qui leur a été faite d'une maison et terre situées à la seigneurie de Coulonge, près cette ville, que mon dit Seigneur Evêque avait acquis du Sr Lenouiller, à constitution de 140 livres de rente," ainsi qu'on le voit par une quittance de la somme de 2,800 livres et de tous les arrérages de la rente, passée devant Mtre Boucault, notaire, le 8 février 1744.

Notons que durant ce laps de temps il était devenu dû au séminaire,¹ comme seigneur de la chastellenie de Coulonge, plusieurs années de cens et rente seigneuriale sur cette terre et en plus les lods-et-ventes sur le prix d'achat. Mais comme le fond se trouva par le fait réuni au domaine de la seigneurie, la créance privilégiée du seigneur à cet égard devint purgée par là même par rapport à la terre. En sorte que le titre et la prise de possession du Séminaire demeuraient valides malgré les revendications exprimées par l'évêque, à moins par lui de faire le remploi du prix payé à son acquit, avec les arrérages de la rente et acquitter tous les droits dus. De plus durant ce même laps de temps, on perd de vue le paiement par lui de la rente stipulée de 140 livres depuis 1732 jusqu'à 1744.

Cette terre de Samos contenait, en réalité, tout près de 70 arpens en superficie, au lieu de 50, mais la très-garde partie était en forêt primitive de beaux bois de chêne et de pin et ne donnait pas encore de rendement, parce qu'on tenait à les conserver comme ornant le domaine et accroissant sa valeur.

Quand les messieurs du Séminaire s'en départirent dix-huit ans plus tard, comme nous l'allons voir ci-après, cette réserve de bois fut stipulée expressément pour leur terre adjoignante de Saint-Michel.

¹ Je dois exprimer mes remerciements à M, l'abbé A.-E. Gosselin, du séminaire de Québec, pour son aide et son obligeance à me communiquer les archives du séminaire.

Nous avons la photographie d'un dessin intitulé *Le bois de Samos* qui semble faire plus apprécier le bois que l'habitation qui s'y trouve. Vu qu'il ne montre pas de date pour en fixer l'époque, il est difficile de dire si la maison qu'on y voit est bien celle de l'évêque de Samos, ou bien celle restaurée par les propriétaires subséquents, soit Thomas Ainslie ou le juge Mabane.

Avant de passer outre et de nous séparer de l'évêque Dosquet, devenu évêque de Québec, comme il est le premier et le principal personnage parmi ceux, tous remarquables, qui ont ensuite habité la villa de Samos, il n'est pas hors de propos de raconter brièvement ce que l'on connaît de lui par les documents contemporains.

Choisi comme coadjuteur par Mgr. Duplessis-Mornay, de l'agrément du roi, Mgr Dosquet avait été fait évêque de Samos *in partibus* depuis 1725, mais il n'était pas Français d'origine. Il était Flamand; on l'a dit né à Lille, la ci-devant capitale de la Flandre française, maintenant dans le département du Nord. L'abbé Auguste-H. Gosselin le dit né à Liège, sans toutefois ne le prouver que par inférence.¹ Dans l'un et l'autre cas, il était Flamand, ça suffit. Non dépourvu d'habileté ni d'ambition, il se réclamait de cette qualité d'étranger auprès de la cour de France, prétendant que dans la diplomatie il était ainsi plus à même de rendre secrètement des services au roi. Il est possible, et même probable, qu'avec ses talents, il eût été plus habile et plus laborieux dans les missions diplomatiques à travers l'Europe, que dans le cours de ses missions apostoliques chez les sauvages du vaste territoire de la Nouvelle-France, lesquelles lui sont restées en perspective seulement, comme celles des Indes où il devait d'abord aller. Son administration diocésaine ne semble pas montrer chez lui beaucoup de zèle pour l'exercice des fonctions épiscopales, ni un grand succès durant ses dix années d'épiscopat pour toute la Nouvelle-France. Il est vrai qu'il faut tenir compte qu'à son arrivée Québec se trouvait dans une époque fâcheuse de troubles et de dissensions civiles et religieuses, lesquelles furent poussées, au chef-lieu même de son évêché, à des excès regrettables et à des rigueurs extrêmes, comme on le vit après la mort de Mgr de Saint-Vallier. Dans ces circonstances difficiles, il lui fallait une grande prudence, beaucoup d'esprit de conciliation, de discernement, de tact et d'adresse, pour amener des apaisements. Son tempérament, froid en apparence, se montrait parfois vif, brusque et hautain. Ce manque de douceur, ou plutôt son absolutisme, joint au défaut d'expérience locale pour conduire le petit peuple vain, susceptible et glorieux qu'il était appelé à diriger, lui attirèrent peu d'estime d'abord, puis un manque de confiance qui assombrissait tout autour de lui. Ainsi que

¹ *Mémoires de la Soc. Roy. du Canada*, 1899, Vol. V, p. 28, 2ème Série.



Bois de Samos

l'avait prévu Mgr de Mornay, il se dégoûta bientôt du pays et alla séjourner en France, puis abandonnant la résidence il laissa son vaste diocèse sous la conduite de grands-vicaires, dont le premier mis en office était inexpérimenté et trop jeune,—tant et si longtemps qu'enfin on lui força la main pour le faire renoncer à son évêché. Il ne manquait pas cependant des vertus ordinaires d'un bon ecclésiastique et sa conduite privée fut toujours irréprochable. L'état de sa santé, dont il se plaignait fort, lui servait d'excuse pour se dispenser des fonctions actives de sa charge. Cependant, cette santé ne pouvait guère être bien mauvaise puisqu'elle le porta jusqu'à l'âge de 86 ans.

A part une couple de mandements rédigés dans son cabinet d'étude, l'un sur l'instruction populaire, qui, vu son absence, ne produisit pas d'effet sensible, et l'autre bien dirigé et énergique contre la vente des boissons enivrantes aux sauvages, lequel eut un grand retentissement, on ne voit pas que Mgr Dosquet ait manifesté par ailleurs une grande ardeur pour diriger dans de gras pâturages le troupeau qui lui avait été confié. Cependant, on ne peut s'empêcher d'observer, pour le regretter, que, sur ce dernier mandement, pressé par le ministre au sujet du tort par là fait au commerce des fourrures, il ait cédé un peu de terrain et mis du tempérament, sous forme d'explication, pour atténuer la portée de son acte épiscopal. Sur ce point ses deux prédécesseurs ainsi que les missionnaires avaient fait preuve d'une fermeté inébranlable. En fait, la traite de l'eau-de-vie n'en continua pas moins, comme par le passé, en s'échappant en partie par cette modification.

Le coadjuteur, dès les premiers mois de son arrivée, commença à se décharger des soins du diocèse en nommant pour grand-vicaire M. de la Tour, jeune prêtre de 28 ans, qu'il avait amené avec lui et qui le suppléa tant en son absence qu'en sa présence et tant bien que mal.

Ce jeune abbé était fils de M. de la Tour, Ad^{al} au parlement de Toulouse, qui, par son influence, le fit nommer par le roi doyen du chapitre de Québec le 2 mai 1729, à la place de M. de Glandelet, décédé depuis 1725. De plus, il fut nommé, avec les émoluments d'office de 300 livres, conseiller au Conseil Supérieur. Grâce aux faveurs de la cour, il toucha de la sorte deux parts de chanoine, c'est-à-dire, 1200 livres, qu'on voit avoir été décidé par le roi lui appartenir, suivant la lettre du 20 avril 1732, et il garda son doyenné jusqu'en 1733. Ce grand-vicaire était de bonne famille, et ainsi pourvu, tirait du grand, faisait tout haut la main. D'un esprit contentieux et tracassier, sans expérience en ce pays, il cassait les vitres, toujours soutenu par l'évêque qui ne faisait rien par lui-même. Celui-ci pontifiait dans l'occasion et c'était là à peu près toute la montre du décor. Heureusement que le régime de l'abbé de traiter cavalièrement le peuple et un

peu de même le bas clergé, ne fut pas de longue durée, car le pays en fut débarrassé en 1731, où il retourna en France.

L'abbé de la Tour a laissé, entre autres, un écrit au titre de *Mémoires sur la vie de Mons. de Laval, Cologne, 1761*, lesquels font voir l'auteur sous un aspect autrement caractérisé pour le mieux. Il mourut à Montauban, curé de St-Jacques et doyen du chapitre de cette ville. Il avait refusé en 1733 la cure de Québec.

Les annales religieuses de l'époque ne montrent pas sous un jour favorable les graves démêlés alors engagés parmi le clergé de Québec, ni la bonne entente de l'évêque avec son chapitre. Son ordonnance pour obliger le chapitre de Québec à une procession d'un usage récent chez les Jésuites et le retrait après coup de cette ordonnance, avec injonction de n'en plus parler, indiquent chez lui un manque de discrétion et de suite. Ce faux pas ne servit qu'à augmenter les aigreurs mutuelles en les envenimant. Ce cérémonial d'étiquette exigé, qui n'était qu'un compliment aux Jésuites, fut une dévotion grimaçière et fielleuse plutôt que chrétienne. Il ne montrait aucune raison d'être comme office religieux obligatoire et tomba de lui-même en désuétude. A distance, on n'y voit qu'un entêtement de part et d'autre sur des prétentions d'une puérilité inepte qui donne, entre autres, un exemple de plus de l'étroitesse d'esprit du français d'alors et du caractère normand dont il était imprégné, comme aussi des vanités rivales des personnages en scène.¹

Les préséances, les exigences, les prétentions et les formalités d'étiquette étaient alors d'importance si majeure, qu'on semblait oublier le fond en cause en les faisant prédominer. Ces usages d'un autre siècle, vus à distance, nous paraissent aujourd'hui étranges et bien petits. Les principaux documents historiques du temps sont remplis de ces débats sur le cérémonial et de guerres de lutrin qui prennent place à l'égal des grands événements du jour. Heureusement que ces futilités n'ont pas pris racine sur notre terre d'Amérique. Ce qu'il y a de singulier, c'est qu'à côté de ces exigences et de ces prétentions orgueilleuses, soit personnelles, soit au nom sonore et bruyant de ce qu'on appelait *les libertés de l'église gallicane*, on voit un bizarre contraste avec la subjection, disons le mot, l'asservissement complet et général envers le roi auquel on appelait pour décider de tout, au spirituel comme

¹ Nous omettons de suivre l'interminable correspondance et les tracasseries que l'évêque s'est suscité et a fait subir aux gens de la ville, au sujet d'une porte à l'évêché qui débouchait du chemin de ronde des remparts dans la Côte de la Montagne vis-à-vis l'escalier actuel. L'évêque voulait la tenir fermée et empêcher le public d'aller s'y ébaudir et le troubler de si près. A la fin, de par le roi, en dernier ressort, elle dut rester ouverte au public.

au temporel. Dans notre atmosphère de liberté et avec notre tempérament devenu plus rassis et plus composé, on s'en moque maintenant, en voyant ce servilisme et ces appels constants au roi, en matières ecclésiastiques, tant par le clergé que par les laïques, comme s'il eut été un suffragant de Sa Sainteté à Paris, ou un pape d'Avignon,—souvent pour des riens, comme qui aura ou n'aura pas l'encens, l'eau bénite et le pain bénit le premier, etc.

Sur un autre sujet, quant à son temporel, le coadjuteur ne négligeait pas d'étaler la faiblesse de ses ressources et de demander les grâces, les gratifications et les secours du roi. Lors de son départ pour le Canada, une gratification de 1,000 livres lui fut accordée, et l'année suivante, Mgr Duplessis-Mornay, dans la crainte que son suffragant ne se dégoûtât du pays, se détermina à lui en procurer une autre. Ayant représenté au roi les pertes qu'il avait subies dans le naufrage de *l'Eléphant* et les dépenses à faire pour rendre le palais épiscopal habitable, Mgr de Samos reçut une gratification extraordinaire de 3,000 livres, en sus de la gratification ordinaire.¹

Le roi continua au coadjuteur, en 1732, l'ancienne gratification de 500 livres accordée en 1688 par la Compagnie à l'évêque de Québec, à prendre sur son domaine. Par lettre patente du 24 décembre 1733, Sa Majesté le mit en possession des fruits et revenus de l'évêché de Québec, lesquels devaient comprendre ceux entr'autres de l'abbaye de Bénévent, dont la réunion à cet évêché avait été promise le 26 septembre 1729 et ensuite consommée.

A cette époque, il régnait dans les rangs du clergé à Québec, principalement parmi les membres du chapitre, dont plusieurs n'assistaient pas au chœur, une manie de faire des exploitations et des entreprises commerciales et industrielles, même des défrichements. Il est à croire que Mgr Dosquet se ressentit du même mal, au point de vouloir devenir agronome, car, dans ce but avoué, il obtint en 1731, une concession à titre de fief et seigneurie, sur la rivière Silhouette qui tombe dans la rivière Yamaska, de quatre lieues de terre de front sur autant de

¹ Les détails des réclamations des particuliers à l'occasion des pertes résultant de ce naufrage, comme passagers, sont curieux à voir. Suivant le procès-verbal de la perte du vaisseau transmis officiellement, elles seraient nulles, car il y est déclaré que tout a été sauvé à l'exception des poudres, du biscuit, de quelques futailles à eau et de quelques pièces de canon. Cependant, le roi qui avait payé les frais du sauvetage, accorde la demande de M. Hocquart pour ses pertes au montant de 6,000 livres; Mgr Dosquet s'y présente et reçoit 3,000 livres, tant pour ses pertes que pour ses dépenses de réparations à faire au palais épiscopal; d'autres passagers viennent pour des montants de 500 à 600 livres. Hocquart revient encore pour 2,000 livres qu'il ne réussit pas cette fois à obtenir — Cf. *Lettre du Ministre de la Marine à M. de St-Maur*, 29 Nov. 1729 — *Arch. Can.*

profondeur et coupée en deux par la rivière Silhouette. Ce projet n'aboutit à rien autre chose qu'à des frais inutiles.

En mai 1736, pendant son séjour en France, le roi lui fait une autre gratification de 3,000 livres, *ayant égard à sa situation peu aisée*, à prendre sur la recette des revenus de l'abbaye de la Victoire, dans le diocèse de Senlis, alors vacant. Un mois auparavant, il avait obtenu un congé du roi de six mois pour aller voyager en Flandre et il en profita. Le temps ainsi s'écoulait sans évêque diocésain résidant pour tout le Canada, et toujours sans la démission du titulaire que vainement l'on attendait, et sans qu'il fut pourvu d'un coadjuteur.

Malgré toutes ces faveurs à l'évêque, le ministre qui, dès 1737, lui avait écrit que ses demandes pour arranger ses affaires avaient paru excessives, lui représenta, en mai 1738, qu'il ne pouvait ignorer que son diocèse n'était pas dans une situation à se passer de la présence d'un évêque et qu'il espérait que son zèle pour les intérêts religieux le déterminerait à prendre un parti, soit de s'y rendre ou de donner sa démission; qu'il était temps qu'on sût à quoi s'en tenir; que s'il voulait mettre des conditions à sa démission, il le dit; qu'on attendait une réponse prompte et décisive. Mgr Dosquet semble ne s'être inquiété en rien de ces représentations. A la fin de l'année 1738, le ministre se montre surpris des nouvelles exigences de l'évêque et lui déclare net qu'il s'agit pour le présent de savoir si l'arrangement proposé lui convient ou non. S'il ne lui convient pas, il devra s'arranger pour retourner le printemps prochain à Québec, sans quoi le roi prendra les mesures nécessaires pour y pourvoir. Alors, il n'aura plus à compter sur le bénéfice de l'abbaye de Breine ou autre chose. Le ministre termine en lui disant qu'il est chargé par le cardinal Fleury de lui déclarer ces choses une fois pour toutes.¹

¹ Le cardinal Fleury avait été précepteur de Louis XV et devint son ministre en 1726, quoique âgé de 70 ans. Lors des troubles et des dissensions qui surgirent à Québec, après le décès, en décembre 1727, de Mgr de Saint-Vallier, au sujet de son successeur, la cour dut intervenir, et par arrêt du 2 mars 1729, elle confirma la prise de possession de l'évêché par le successeur en titre, Mgr Duplessis-Mornay. Puis, l'évêque de Samos, son coadjuteur, devint lui-même évêque de Québec, par la démission de Mgr de Mornay qu'il donna le 12 septembre 1733. Son âge et ses infirmités l'avaient empêché de se rendre dans son diocèse quoiqu'il en fût l'évêque en titre depuis 1727. Son coadjuteur, qui n'y était venu qu'en 1729, abandonna la résidence et le pays en 1735. Dans ces diverses circonstances, le diocèse avait beaucoup souffert, d'abord de l'absence involontaire pendant 13 ans de Mgr de Saint-Vallier, détenu prisonnier, puis de la non-résidence de ses deux successeurs. Il subissait alors une espèce d'interrègne. Le cardinal Fleury cherchait à y porter remède et avait depuis quelque temps jeté les yeux sur un digne prêtre du diocèse de Chartres, dont la piété et l'humilité étaient les seules recommandations qu'on pût lui voir. Il se nommait

Cependant l'évêque mettait des exigences toujours croissantes pour donner sa démission; pourtant, en sus de l'abbaye de Bénévent, valant 3,000 livres, on lui offrait le bénéfice de l'abbaye de Breine, dans le diocèse de Soissons, dont le revenu était estimé à 6,000 livres.

Néanmoins, ce ne fut qu'en mai suivant, en mai 1739, à la dernière heure, au moment du départ des vaisseaux, qu'il se résigna enfin à donner (si c'est là un don et non un troc) la démission de son évêché; encore, voulut-il conserver sa juridiction jusqu'à l'année suivante par son grand-vicaire, M. Miniac.

Le reste de la carrière de l'évêque Dosquet ne présente pas d'intérêt pour les Canadiens. Il est tombé dans l'oubli, et sauf le nom de Samos donné à une partie du chemin du Cap-Rouge, et la batterie historique dite de Samos, lors du siège du Québec, aucun souvenir populaire n'existe pour rappeler la mémoire de l'ancien évêque de Samos, devenu évêque de Québec.

Après la guerre la maison de Samos fut trouvée détruite, sauf les murs restés debout. Au-delà de 1762, nous n'avons encore pu trouver

Paul Cassegrain, né à Angersville, en 1693, curé de Bouglainval en 1732, et fondateur en 1734 et directeur de la communauté des Sœurs de St-Rémy d'Auneau, ensuite connu sous le nom de Bon-Secours de Chartres. Il était aussi chanoine de cette cathédrale. Le cardinal lui offrit l'évêché de Québec, mais ne s'en croyant pas digne, l'humble prêtre refusa respectueusement cette dignité. Le cardinal tenait en grande estime l'abbé Cassegrain et lui donnait toute sa confiance. Il le retint pour son chapelain et son confesseur. Ce vertueux prêtre ayant rempli sa vie de bonnes œuvres, mourut à Auneau, arrondissement de Chartres, en 1771, à l'âge de 78 ans. Sa vie a été écrite par son neveu, Paul Antoine Cassegrain, aussi chanoine de Chartres en 1765, mais n'a pas été imprimée.

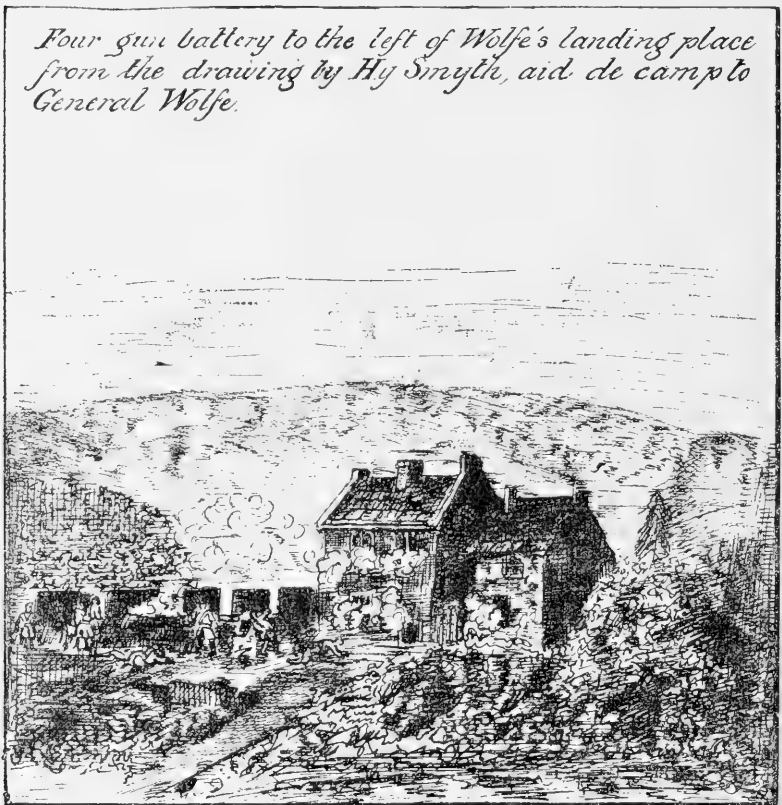
J'allais en Italie en 1867, et en traversant les Alpes, par Chamounix, je fis la rencontre dans la diligence d'un capucin, le père Laurent, supérieur d'une maison de religieux à Paris, homme fort instruit, très spirituel et de bonne compagnie; de plus, bien renseigné, il connaissait tout à la ville et à la cour. En causant, il voulait relier ma famille à celle de l'abbé Cassegrain, dont je parle, et il avait raison, à cause de la commune origine locale et de l'atavisme que j'ai pu vérifier plus tard. Il disait que c'était un saint à canoniser, dont on se rappelait encore les vertus.

A mon retour de Rome, un mois après, Mgr Pie, alors évêque de Poitiers, puis cardinal, avec lequel j'eus l'honneur de m'entretenir longuement, en route sur le vapeur d'Ostie à Marseille, me confirma pleinement le dire du père Laurent et l'existence du M. S. S. de la vie de l'abbé Cassegrain, que je n'ai pu retracer.

J'ai trouvé ensuite ces renseignements confirmés dans l'ouvrage de l'abbé Joseph Beauhaire, *Chronologie des Evêques, des Curés, des Vicaires, et des autres prêtres de ce diocèse, depuis les temps les plus reculés jusqu'à nos jours, Chartres, 1892.*

Il contient les détails ci-dessus relatés concernant l'abbé Paul Cassegrain.

aucun indice de son genre de construction, si ce n'est le carré en pierre de l'édifice, donnant ses dimensions, ses portes et croisées, d'après le plan de l'arpenteur Plamondon dressé alors et que nous reproduisons. Quant à son aspect extérieur, nous avons un croquis ou dessin au crayon qu'on croit être une vue de la villa sous la désignation de *Bois de Samos*. Nous en donnons une copie photographiée que nous devons à l'obligeance de M. Doughty, l'archiviste si compétent du Dominion. Quant au dessin de Hervy Smyth, représentant la maison et la batterie qu'il nomme de *Sillery*, nous pensons que c'est un croquis de la maison



Saint-Michel des MM. du Séminaire de Québec, croyant pouvoir le démontrer ci-après.

Devenu propriétaire de la terre et habitation de Samos, ainsi qu'on l'a vu, le Séminaire de Québec en disposa d'une partie comme suit; c'était à la veille de la cession attendue du pays:— Le 14 décembre 1762, par acte devant M^{re} J.-C. Panet, notaire, il vendit à M. Thomas Ainslie, receveur des douanes à Québec, “une quantité de terre sur laquelle se trouve le quarré de la maison de campagne de MM. les

“ecclésiastiques, dit la maison de Samos,¹ située près de la ville de “Quebec,” (à être mesurée et bornée, y est-il dit, l’hiver prochain), “relevant du fief de Coulonge.” Elle s’est trouvée être de 42 arpens en superficie, bornée au nord-est par le ruisseau Belleborne et au sud-ouest par une ligne droite distante des deux extrémités de quatre arpens du dit ruisseau, bornée au sud à la haute marée, à continuer jusqu’au grand chemin; la dite terre telle que figurée ensuite par le procès-verbal de mesurage et bornage dressé par l’arpenteur Plamondon en date du 27 mai 1763, dont nous avons pris copie pour la produire au besoin.

L’idée du retour du Canada à la France, même trois ans après la conquête, ne pouvait être arrachée du cœur des Canadiens, comme on va la voir.

Par ce contrat il fut stipulé ce qui suit comme conditions par les Messieurs du Séminaire:

“Laquelle présente vente cependant n’aura lieu qu’au cas que cette colonie demeure à l’Angleterre et ne sera le dit Sieur Ainslie tenu de payer le prix de la vente qu’à la paix qui décidera du pays; et dans la supposition contraire que le pays retournât à la France, soit par le sort des armes, soit par le prochain traité de paix, la dite vente sera nulle de plein droit et Messieurs du Séminaire rentreront en possession de la susdite terre et maison avec les améliorations que mon dit Sieur Ainslie s’oblige d’y faire dès le commencement du printemps prochain,—et spécialement d’y faire établir la dite maison de Samos en réparations de maçonnerie, charpente, plancher, et couverture, etc., dans le cours du printemps prochain,—dont il jouira ainsi de la terre jusqu’à parfaite décision du pays et ville de Québec, desquelles améliorations il ne pourra requérir aucun dédommagement, ni ne détériorera en rien, dans le cas que le Séminaire rentrât en possession; et faute

¹ C’est ici le lieu de remarquer, pour éviter la confusion qui peut naître de cet énoncé, que ces endroits spécifiés et cette maison de Samos, n’étaient pas originellement la maison de campagne de ces Messieurs, et ne pouvait l’être avant leur acquisition en 1744. A l’encontre, il est établi que la maison de récréation de leurs élèves était la maison appelée Saint-Michel, dans le fief Saint-Michel. Les archives du Séminaire sont là pour prouver que, lors de l’incendie du Séminaire, en 1701, les élèves étaient en congé à la maison de Saint-Michel. Celle-ci fut remplacée par la maison Maizerets qui fut construite à cette fin sur la terre à Beauport acquise par le Séminaire, le 14 janvier 1705. Cette destination ainsi énoncée en 1762 ne paraît guère conciliable avec les époques établies par les dates ci-dessus, et ne peut guère s’accorder avec l’interrègne de 1735 à 1744. Au surplus, la terre de Samos, était donnée à bail, au moins depuis 1750 à 1757, et tenue par Jacques Berthiaume, fermier, suivant les comptes du Séminaire, & *Reg. Prév.*, 15 déc. 1755, p. 57, *vo.*

d'exécution des conditions ci-dessus mentionnées, le présent contrat de vente sera nul à la fin du mois de juillet prochain."

Il est important pour l'identification subséquente du site de la maison de Samos de ne pas oublier que l'arpenteur Plamondon a fait le plan vertical du carré des murs qui en restaient et de remarquer aussi que la pierre angulaire des fondements, tel que posée par l'évêque de Samos, contenait une plaque de plomb sur laquelle étaient gravées une mitre d'évêque et une inscription latine que nous allons retrouver ci-après. Ce plan formait partie de l'acte notarié et est paraphé comme tel par le notaire instrumentant, M^{re} Panet.

Vu la cession du pays par le traité de paix de 1763, M. Ainslie demeura propriétaire absolu, tel que stipulé, de la maison de Samos et du terrain acquis ainsi délimité; mais il s'en départit peu après, non cependant sans y avoir fait les améliorations notables qui lui avaient été imposées, et diverses autres à sa convenance, comme de défricher le sol pour le mettre en partie en état de culture, tout en ménageant la forêt de beaux bois qui s'y trouvait et garnissant l'habitation de meubles, d'ustensiles de ferme et de bétail pour en faire une résidence de campagne complète. Alors, il lui donna le nom de *Woodfield*, bien approprié à l'étendue des bois de forêt primitive qui le couvrait,—nom qu'il a gardé jusqu'à tout récemment, qu'il a pris celui de *Saint-Patrick's Cemetery*, suivant sa destination actuelle de cimetière pour les Irlandais catholiques.

Thomas Ainslie est le même qui a tenu un journal de l'invasion des Américains en Canada de 1775-6, qui a été publié par la Société Littéraire et Historique de Québec dans ses annales (*Transactions*) de l'année 1905. Il était capitaine dans la milice anglaise durant le blocus de la ville.

Thomas Ainslie fut le premier percepteur des douanes nommé dans la colonie, dont le bureau central était à Québec. La plaque funéraire de marbre incrustée dans le pignon ouest du presbytère de la basilique de Québec rappelle son nom et celui de Mary, son épouse, inhumée là, le 14 mars 1767, dans l'ancien cimetière catholique de l'église, dont les protestants se servaient alors faute d'autre.

Pendant qu'il était ainsi amélioré par Ainslie, *Woodfield* fut occupé par l'honorable Thomas-Adam Mabane, écuyer, un des juges de la Cour des Plaid-Communs de Québec, lequel en avait été mis en possession depuis quelque temps, soit comme locataire, soit en prévision de lui en passer titre. En effet, M. Ainslie lui en consentit la vente le 4 septembre 1769 par acte devant M. J.-C. Panet, notaire, le désignant comme terre vulgairement appelée "*Woodfield*" et tel que délimité par le même procès-verbal; lui vendant aussi la maison de pierre dessus

construite et autres petits bâtimens en dépendant; “ensemble, tous les “meubles, utensiles de ménage, d'agriculture, bestiaux, qui étaient “dans la dite maison et sur la dite terre, sans aucune réserve, lesquels “le dit juge Mabane reconnut avoir en sa possession, s'en déclarant “satisfait et dispensant de tout inventaire — disant le tout être à sa “connaissance pour en être *en possession depuis longtemps*.” Le prix stipulé est dit de 12,000 schellings (\$2,400). Il est présumable que cette entrée en possession par le juge avait suivi d'assez près sa nomination comme tel en 1764.

Lors de l'invasion des Américains, leurs troupes s'emparèrent de l'habitation et s'en servirent comme hôpital pour les blessés et les inva-



ADAM MABANE.

lides. Ils causèrent, ce qui va de soi, des déprédations et des dégâts à la maison ainsi qu'aux dépendances. Le Gouvernement, sur représentation, indemnisa le propriétaire des pertes et dommages soufferts, ce qui lui permit de réparer l'édifice en entier et de lui donner un meilleur aspect.

Durant l'invasion et ces réparations, le juge Mabane qui était rentré en ville, habita la maison rue St-Louis, ci-devant appartenant à M. de Ramsay, lieutenant de Roi. et habitée par lui à Québec. Elle fut ensuite appelée *Kent House*, pour avoir été occupée par le duc de Kent, lorsqu'il était de garnison à Québec. Le juge en fit l'acquisition de M. Strachan, par contrat devant Mire I.-A. Panet, notaire,

en date du 27 octobre 1777; elle tomba ensuite dans sa succession et fut vendue par décret forcé sous le nom de *Kent House*.

Ayant alors repris sa résidence à la campagne, il en étendit les limites en prenant à bail, de l'agrément du Séminaire, la terre avoisinante de Saint-Michel et autres adjacentes, qui avait été louées à un nommé William Miller, le 17 janvier 1780, suivant bail à longues années, devant d'Artigny, notaire; et moyennant cinquante portugaises (£100) Miller lui fit cession de ses droits en forme authentique devant le même notaire d'Artigny, le 3 mai 1780.

Le prix de ce loyer paraissait nominal, une guinée par année, mais était compensé par diverses charges, telles que l'entretien et la conservation des bois de haute futaie, la plantation d'arbres forestiers, d'ornement et fruitiers, de manière à former un beau bocage et un bon verger, aussi, d'entretenir de taillis le défaut de la côte vers le fleuve, et les clôtures, etc., etc.

Ces conditions remplies en conséquence convenaient et plaisaient aux deux parties comme utiles au fond autant qu'agréables en jouissance. C'est sous le juge Mabane que l'habitation de Woodfield, s'accrut, croyons-nous, de divers embellissements et prit les proportions d'un spacieux quadrilatère, avec cour intérieure.¹ L'ensemble, joint à la beauté du site dominant sur le fleuve, en fit une des plus belles résidences auprès de la ville. Elle était fréquentée par le meilleur monde du temps. Le général Powell en était voisin; le gouverneur Haldimand la visitait; le général Riedesel en était le commensal, et divers autres personnages et amis du juge s'y plaisaient à le rencontrer.

L'air pur de la forêt apportait le parfum des bois, et les ombrages des longues allées rafraîchissaient des ardeurs du soleil d'été quand on désirait s'y promener pour se délasser dans les chaudes journées de la belle saison. Tout conspirait pour en faire un délicieux séjour et une tranquille retraite pour un homme d'étude, tel qu'était le juge Mabane. Il l'habita pendant vingt-cinq ans.

Cependant tout ne fut pas constamment rose dans cette belle demeure. Malgré sa probité, sa droiture et son caractère irréprochable, Mabane encourut la disgrâce du gouverneur Carleton à cause des idées de saine justice qu'il cherchait à faire prévaloir envers la Couronne, mais avec fermeté, tant en faveur du peuple conquis qu'envers ses compatriotes anglais. On lui enleva, sans lui en assigner les motifs, sa place de juge et celle de conseiller exécutif. Ses derniers jours furent

¹ La description donnée en 1782, sur saisie par le shérif de Québec comme "une maison dessus construite en pierre, à deux étages et autres "bâtimens joignant la dite maison et dans les environs d'icelle," nous semble désigner le quadrilatère déjà complété par le juge Mabane.

tristes. Il mourut le 3 janvier 1792, à l'âge de 58 ans; il n'était pas marié. On attribua sa mort au froid qu'il prit dans une tempête de neige en voulant se rendre à pied de sa demeure à la ville. Il perdit son chemin dans la poudrerie; on le trouva égaré, épuisé, transi de froid. Ramené chez lui, il prit le lit pour n'en plus se relever.

La carrière de cet homme de bien n'est pas assez connue: on ne lui a pas fait, de son temps, le nom et la réputation qu'il méritait comme citoyen utile et loyal sujet.

L'abbé Bois nous a laissé une étude remarquable et très judicieuse sur le juge Mabane, lequel, dit-il en la commençant, "offre un sujet intéressant et digne de piquer la curiosité du lecteur canadien. Comme plusieurs hommes de la période où il a vécu, M. Mabane a été jugé sévèrement. On ne lui a pas donné une place assez belle dans l'histoire de notre colonie. Ajoutons qu'on ne lui a pas laissé assez grande la part qu'il avait prise dans l'administration de la justice et dans la composition des tribunaux, comme aussi dans les arrangements et les arrêtés du pouvoir à l'époque où il vécut en cette province."

Mabane, doué d'une intelligence peu commune, était un homme fort instruit. Né en Ecosse, il y fut reçu médecin et passa au Canada. En abandonnant la profession médicale, pour remplir à Québec la charge de juge qu'il n'avait aucunement convoitée, il devint un magistrat utile et respecté par son intégrité et son impartialité. D'un esprit droit, d'un jugement sain et d'un grand sens d'équité, il ne tarde pas, avec l'assistance de collègues français, à suppléer par l'étude et la pratique à son manque de connaissances légales au début. On peut voir néanmoins en parcourant les registres de la Cour des Plaids-Communs qu'il se familiarisa bientôt et suffisamment avec la routine des affaires, de manière à donner satisfaction dans une charge qu'il avait d'abord déclinée et n'avait acceptée que pour se rendre utile.

Le fait qu'il fut ensuite choisi par le même gouverneur comme un des quatre membres du Comité nommé pour s'enquérir de l'état des archives du pays, en 1787, est une preuve de sa capacité et de son caractère bien établi, suffisante pour atténuer à ce point les préventions de l'autocrate Lord Dorchester. On voit par la correspondance de son successeur, le gouverneur Haldimand, que celui-ci fut loin d'approuver les injustices faites au juge Mabane et qu'il en fit des représentations au ministre en Angleterre, exprimant aussi la mortification qu'il avait ressentie par la révocation, sur de fausses données, de la commission de M. Mabane du grade de chirurgien de l'hôpital de la garnison de Québec. (*Cf. Haldimand Papers, Arch. Can.*, 1781, oct. 23,—1782, oct. 23,—1783, sept. 8. Cependant ce fut pour des raisons plutôt politiques que substantielles qu'on lui enleva ses offices de juge et de

conseiller exécutif. Dans des circonstances difficiles et avec des opinions bien arrêtées et opposées à celles du gouverneur, il ne put s'entendre avec lui, et il subit, par la raison du plus faible, le sort du pot de terre contre le pot de fer. Il avait vécu sans grande ambition et sans étalage. Son caractère désintéressé n'était pas fait pour l'enrichir. La privation de ses émoluments qui étaient assez considérables, le mit à la gêne et finit par l'endetter.

Il laissa une succession embarrassée. Sa sœur Isabella, qui vivait avec lui, et qui était sa seule parente et unique héritière, ne put l'accepter que sous bénéfice d'inventaire.

C'est en cette qualité de bénéficiaire qu'elle fut assignée pour dettes devant la Cour du Banc du Roi du district de Québec, à la poursuite de Alexander Davidson & John Lees, lesquels firent vendre par décret de cette cour les immeubles de la succession, entr'autres la maison de ville, rue St-Louis, dite *Kent House*, et la propriété Woodfield. Cette dernière fut adjugée à Isabella Mabane elle-même, le 13 décembre 1792, pour le prix d'enchère de £700, et le shérif Sheppard lui en conféra le titre de 21 décembre 1794.

Singulière coïncidence, le Lord Evêque et premier prélat anglican de Québec, le très révérend Jacob Mountain, vint habiter la villa Samos de Mgr Dosquet, préparée pour lui à son arrivée d'Angleterre, en l'automne de 1793. Il prit à loyer cette belle résidence et l'occupa depuis lors jusqu'à 1802. Ce personnage remarquable a laissé un nom respecté de toutes les classes de la société, sans égard aux nationalités. Les évêques catholiques et l'évêque anglican de Québec fraternisaient d'estime et de commerce d'amitié réciproque. Même l'ancien et vénérable évêque Briand, quoique valétudinaire et retiré, lui fit un accueil bien cordial; et quand le Lord Bishop vint se présenter il lui donna l'accolade à la française, en lui faisant remarquer qu'il arrivait fort à propos pour mettre à l'ordre ses nouvelles ouailles.

Le 5 septembre 1805, Melle Mabane vendit par contrat devant Mre Têtu, notaire, la villa Woodfield à l'Honorable Matthew Bell, comprenant les 42 arpens en superficie et la maison en pierre à deux étages, ci-dessus mentionnés.

M. Bell fut en son temps un personnage des plus en vue dans le pays. Grand industriel, fortuné, large et libéral, il devint populaire et jouit d'une réputation enviable. Né en 1768, à Berwick-on-Tweed, sur les confins de l'Ecosse, il passa au Canada étant tout jeune homme. Il s'établit à Trois-Rivières, où il devint par la suite le seul exploitant des forges de Saint-Maurice. En 1800, il fut élu député du comté de Saint-Maurice et le mandat lui fut renouvelé jusqu'en 1814. Il siégea ensuite au Conseil Législatif depuis 1822 à 1838.

Le rendement des forges, sous son habile direction, devint très considérable. Les produits ne pouvaient suffire à la demande. Aussi M. Bell profitait de son opulence pour mener la vie à grandes guides. Il recevait à la "Grande maison"¹ le monde aristocratique; les gouverneurs venaient s'asseoir à sa table et avaient à son château leur appartement dit la *Chambre du Gouverneur*, somptueusement meublée.

M. Bell était grand amateur de sport, et lors d'un voyage en Angleterre, ayant été présenté au Roi George III, il reçut de Sa Majesté une coupe destinée aux courses de Trois-Rivières, alors devenues en vogue et dues à l'initiative de M. Bell. Il entretenait également une meute de chiens-courants, la première que l'on ait vue au Canada; son équipage de chasse était monté de chevaux de sang importés. C'est l'origine de la chasse à courre de Montréal, où elle a été transférée et qui descend du *Tally-ho Club* de Trois-Rivières. Un beau trait de ce sportman lui fait honneur. Le lendemain de chaque chasse, il envoyait indemniser les cultivateurs des dégâts qu'elle avait pu causer sur son parcours et tout le monde était content.

Pendant sa carrière M. Bell prit part aux principales entreprises commerciales et charges publiques de la province. Ainsi, en 1805, il était un des maîtres de la *Maison de la Trinité* à Québec; en 1818, un des fondateurs de la Banque de Québec; de même, en 1828, de l'Assurance de Québec contre le feu; il fut un des armateurs en 1831 du *Royal William*, bâti à Québec, et qui, deux ans après, fut le premier vaisseau-à-vapeur qui traversa l'Atlantique. Le beau modèle en bois de ce vaisseau est conservé dans les salles de la Société Littéraire et Historique de Québec.

L'Honorable Matthew Bell est décédé à Trois-Rivières, le 24 juin 1849, âgé de 81 ans. Son nom est encore populaire dans la ville. Il laissa plusieurs enfants qui se sont alliés aux meilleurs familles anglaises de Québec.

En 1816, cette habitation de Woodfield qui avait été encore embellie et agrandie de 26 arpens adjoignants, formant partie de la terre de Saint-Michel et provenant du Séminaire, fut vendue par l'Hon. Matthew Bell le 21 septembre en deux lots par acte devant le notaire Planté, à William J. Sheppard, savoir: 1o. Samos ou Woodfield pour le prix de £4,160, ou \$18,440, plus la rente seigneuriale de 50 centins

¹ La Grande maison était un bel et très vaste édifice en pierre remontant à l'ancien régime; elle dut être construite vers 1740, époque vers laquelle les Forges furent réunies au domaine du Roi pour être exploitées en son nom. MM. Cressé et Martel, préposés à cette exploitation, y vivaient largement, si l'on en croit Franquet qui vante leur hospitalité. Il observe que la régie était fort onéreuse au Roi.

par arpent représentant un capital au denier vingt de \$420; et le reste, les 26 arpens convertis en lots à bâtir (villa lots), pour le prix de £1,550 7 9, ou \$6,201.55.

20. Il vendit le lot de grève attenant à la terre de Woodfield, au même Sheppard et à John Saxton Campbell, marchands associés, mais au profit de Sheppard seul en propriété, pour le prix de £1,450.

Il est là-dessus facile d'établir la valeur d'alors de l'ensemble du domaine de Woodfield, qui ainsi apprécié, se monte à \$30,860.

M. Sheppard, successeur de M. Bell, acquit ensuite par acte devant St-George, notaire, du 13 août 1832, le terrain attenant à Woodfield au sud-ouest, environ 28 arpens en superficie. Il appartenait à George Simpson qui le tenait de John Fraser, par contrat du 25 décembre 1831, devant Mtre Ant.-A. Parant, notaire, lequel l'avait eu par concession du Séminaire du 17 du même mois, devant le même notaire. Ce dernier lot, joint à la terre de Samos telle que vendue comme ci-dessus par le Séminaire, forme aujourd'hui la totalité du cimetière irlandais, Saint-Patrice, et est entré au cadastre officiel de Saint-Colomban sous le No. 205.

Devenu Conseiller Législatif, l'Honorable William Sheppard continua à faire des améliorations à Woodfield et à l'embellir. Il l'habita jusqu'en 1842. La demeure fut entièrement détruite l'hiver suivant par un incendie, avec tout son précieux contenu, bibliothèque, musée, collection d'histoire naturelle, serre, etc. M. Sheppard cultivait les lettres et fut élu à plusieurs reprises président de la Société Littéraire et Historique de Québec, et si sa résidence, à l'extérieur, montrait l'homme de goût, bien plus à l'intérieur y voyait-on l'homme d'étude et de science.

Pour recueillir des détails et des renseignements précis sur ce qu'était Woodfield quand le feu fit disparaître la villa, nous avons eu recours à son fils, M. Maxfield Sheppard, qui a eu l'obligeance de nous adresser la lettre suivante qui répond très bien à notre demande et à notre but.

“96 Bellevue Avenue,

Toronto, 21 Feb., 1900.

“P. B. Casgrain Esq.,

Quebec,

“Dear Sir,

“It affords me pleasure to give you such information as I can, respecting Woodfield in its olden days. A house was built there as a residence for the Bishop of Samos, *but the sketch which you send me* (le dessin de Hervy Smith) *does not represent the house.* It may

possibly be a representation of a *cottage* on the ground *before the house was built*, but I think it more probable that it was nearer to Wolfe Cove Hill. The Bishop's house was a more pretentious edifice. It consisted of two stories and an attic with basement, six windows in each story, on the front, facing the river; four square cottages adjacent, two of which were connected with the house by covered ways, the other two opposite to them. As you wish to know the site of the house, I send you a rough plan of the property made from memory. The proportions are not maintained, for the length of the property is much greater. My father made several additions to the building, one of which was a large conservatory for flowers, the first, I believe, ever constructed in the country.

I do not show them, as they would not be interesting to you. When digging for the foundations of these, a leaden plate was discovered containing an inscription in Latin engraved thereon, headed with the Bishop's mitre, commemorative of the erection of the building. I recollect reading it, but, unfortunately, did not make any note of the date. My father afterwards (but at what time, I do not remember), gave it to the Literary and Historical Society, of which he was president for many years. His remarks accompanying it were, I think, recorded in the Transactions of the Society. If you could look this up, you would probably find whether or not the house was in existence in 1759. The Society occupied rooms in the old Parliament Building, near Prescott Gate, which was burnt down. It is most probable that the plate then perished. This is a misfortune, for it was a matter of some little historical importance. I have no recollection of hearing about a four gun battery on the place, nor have I seen any remains of such a fortification; but I remember seeing a redoubt or two, I think — about 30 feet square each, constructed of earth, in the wood at the opposite side of the highway. Was the battery a part of the French defences? and is it known whether it was near the cliff or further outward?

It is somewhat singular that the place should have been occupied by another bishop, Dr. Mountain, the first bishop of Quebec, who lived there from 1793 to 1802. Subsequently, the Hon. Matthew Bell owned it and my father, the Hon. William Sheppard, bought from him. I was born in the house in 1820 and lived there till it was burnt down, about 1842 or 1843. My father had got together a library of 4,500 books, among which there were no novels; my mother had made and classified a collection of insects, another of minerals and shells, and another containing dried specimens of all the indigenous flowers, plants and ferns — all went up in flames. Writing this recalls the happy days of my youth which I spent there. It was a beautiful place.

When leaving it, I had feelings like those expressed by Bishop Mountain's son, as follows:

"O, must I leave thee, Woodfield? sweet retreat
From the world's busy strife delightful seat
Of rural beauty, where with bounteous hand,
Nature hath lent her charms to grace thy land.

How can I part? How leave thee, charming place?
How leave the beauties which adorn and grace
Thy boundaries? thy rich fields, abundant food
To cattle lending, and thy verdant wood,
Thy firs, thy venerable oaks, thy shades,
Thy purling rivulets, thy deep cascades
Forming a pleasant contrast to the eye?
Thy views, in which no other spot can vie?

And, now, by a cruel fate, severed from thee,
Wherever 'tis my destiny to flee,
Still, I'll remember thee, O Woodfield dear!
And still on thee will drop a tender tear."

"Yours very truly,

M. SHEPPARD."

"I return the sketch."

Cette plaque de plomb ainsi trouvée fut en effet présentée à la Société Littéraire et Historique de Québec, mais disparut en 1854, avec une partie des archives de la Société, dans l'incendie de l'ancien édifice du parlement au haut de la côte de LaMontagne, où la Société occupait des salles.

Par la découverte de cette plaque, on a pu et l'on peut identifier le site exact de la maison de Samos, sans toutes fois admettre tout l'ensemble de la description qu'en fait M. Maxfield Sheppard.

Suivant le plan à main levée ou croquis que ce monsieur nous a fait des lieux pour en donner un aperçu, et d'après divers anciens témoins oculaires d'aujourd'hui, la maison se trouvait située à environ une centaine de pieds de la cime du cap, et avec son jardin attenant, joignait au nord-est le ruisseau Belleborne. L'édifice entier formait un quadrilatère spacieux, ayant cour intérieure. La façade étendue donnant sur le fleuve, avec une belle pelouse au-devant, présentait l'aspect d'un beau manoir seigneurial. Le pont Bonvoisin sur le ruisseau Belleborne le traversait juste au nord du jardin et environ à trois cents pieds de la maison. C'est par ce pont, défendu par un canon, que l'escouade

qui devançait le colonel Howe commença l'attaque dirigée vers la batterie dite de Samos, sur laquelle nous aurons à revenir en référant ci-après aux poste et batterie de Saint-Michel.

Qu'il suffise de dire pour terminer l'historique de la maison de Samos ou de Woodfield qu'après l'incendie de 1842, M. Sheppard rebâtit une nouvelle maison et la plaça au centre de la terre de Samos et l'habita jusqu'en 1847. Alors, MM. Thomas et James Gibb, marchands-associés et dans le haut négoce à Québec, en firent l'acquisition le 29 juin 1847, par contrat devant M^{re} Fages, notaire; et la famille Gibb la vendit aux R.-R. P.-P. Rédemptoristes de Québec, pour en faire un cimetière à l'usage des Irlandais catholiques de l'église Saint-Patrice de Québec, suivant deux contrats de vente en date du 27 décembre 1877, passés devant M^{re} Samuel J. Glackmeyer, notaire. Le prix total stipulé fut de \$20,000. Notons que la seconde maison rebâtie avait aussi été détruite par le feu pendant que les Messieurs Gibb l'occupaient.

* * * * * * * *

Mais où trouver sur les lieux le site où la batterie dite de Samos était montée?

Nous apprenons de diverses sources, entre-autres de la *Relation du Siège de Québec*, que le 19 juillet 1759, Montcalm fit ériger une batterie à cet endroit qu'on appela *la batterie de Samos*. Elle était montée de quatre pièces de 18 et d'un mortier ou obusier. Il plaça aussi plusieurs postes sur la crête des hauteurs depuis l'Anse-des-Mères jusqu'au Cap-Rouge, afin de les défendre et observer l'ennemi s'il tentait une descente de ce côté. Les postes à Samos et à Saint-Michel étaient distincts quoique peu éloignés l'un de l'autre. Suivant un état de Vaudreuil, par sa lettre à Bougainville du 5 septembre 1759, la garnison de chacun de ces postes aurait été comme suit en effectif:

- 150 Hommes à l'Anse-des-Mères et celle du Foulon sous Vergor;
- 30 à Samos, et
- 50 à Saint-Michel, sous les ordres de Douglas, cap^{ne}. du 2^{ème} bataillon du Languedoc;
- 50 à Sillery sous le chevalier de Remigny, cap^{ne}. de LaSarre, et
- 200 au Cap-Rouge, sous de Beaubassin.—*Doughty, Siege of Q., IV., p. 96, lettre reproduite.*

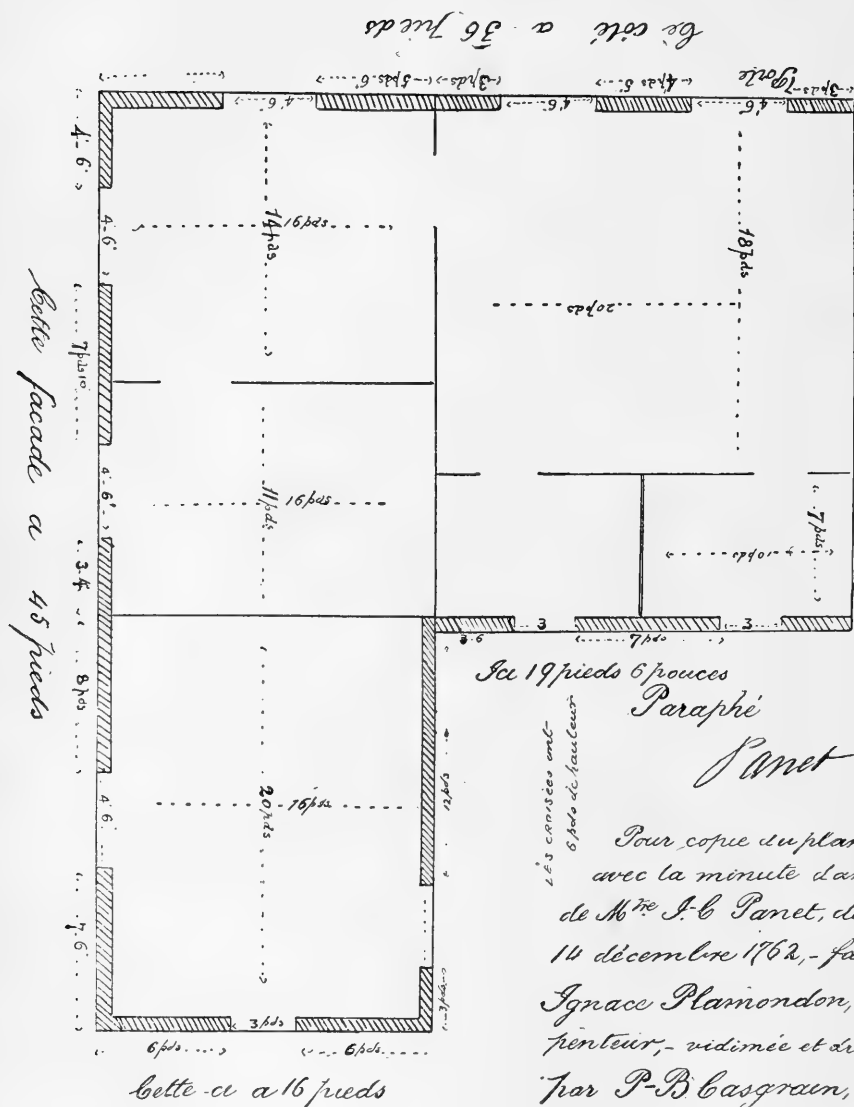
Il est présumable que les 30 hommes postés à Samos, de même que les 50 postés à Saint-Michel n'ont pas manqué d'occuper comme quartiers chacune des maisons ainsi nommées; au surplus, elles étaient toutes deux bâties en pierre, hautes de deux étages, en sorte qu'elles

offraient d'elles-mêmes non-seulement un abri tout fait, mais encore une défense retranchée, comme aussi des redoutes fortes et avantageuses. La maison de Saint-Michel en donna la preuve par le colonel Howe qui, avec son infanterie légère, l'ayant pu prendre sans encombre, y installa aussitôt une bonne garde, laquelle repoussa l'attaque d'un détachement du corps de 900 hommes de Bougainville que celui-ci envoya peu après pour la reprendre.

Afin d'arriver à une solution historique revenons maintenant au poste et à la maison de Saint-Michel, dans le fief Saint-Michel. Ce fief fut originairement concédé à M. de Tilly par la Compagnie de la Nouvelle-France, le 6 avril 1660, représenté par son délégué Cheffault, qui en était un des membres les plus importants. Son étendue est de 160 arpens en superficie, ainsi que l'intendant Talon l'a déterminé par un arrêté du 2 juillet 1668. Le Séminaire en fit l'acquisition de M. Charles le Gardeur de Tilly et Dame Geneviève Juchereau, son épouse, suivant contrat passé devant le notaire Becquet, le 26 avril 1678. Ce fief, aussi appelé terre de Saint-Michel, est borné, suivant les tenants et aboutissants en 1759, au nord-ouest par la ligne droite qui le sépare encore de la seigneurie de Sillery, et au nord-est par le trait-carré des terres qui sépare le coteau Sainte-Geneviève des terres de la Grande-Allée, au sud-est par les terres du Séminaire, au sud-ouest au fleuve Saint-Laurent. La largeur de la terre aurait été, en 1751, de huit arpens et un quart, suivant que M. Jacreau a pu alors l'établir, étant procureur du Séminaire. En descendant vers la cime du cap, elle forme en la suivant une pointe qui joint la ligne de Sillery. D'après une mesurage de M. Jacreau, sur cette pointe, à 5 arpens, 2 perc. 16 p, en remontant de la cime du cap et delà en trait-carré courant est de cette ligne, 3 arp. 7 perc. 16 pds, on arrive là où se trouvait, près de la cime du cap, la maison de la terre dite de Saint-Michel, laquelle n'était pas ordinairement donnée à ferme. Du moins, de 1750 à 1757, le nommé Nicolas Magny avait été placé comme gardien de la maison et du verger et recevait pour ce service 100 livres par année.

Cette maison est indiquée comme bâtie en cet endroit sur un plan à main levée par M. Jacreau, vers 1751, qu'on peut voir aux archives du Séminaire et elle montre son carré avec une aile y attenante. Elle existait encore en 1874 lors de la confection du plan cadastral de Saint-Colomban et y est marquée au même endroit. Mais elle a été peu de temps après complètement détruite par un incendie; il n'en reste plus pour l'indiquer que les vestiges du carré des murs et le creux de la cave.

En la comparant au dessin de la batterie dite de Sillery que nous a laissé Hervy Smith, l'aide-de-camp du général Wolfe, d'après la grande gravure historique du débarquement de l'armée anglaise, due au burin



Le 19 pieds 6 pouces
Paraphé

Panet

*Pour copie du plan qui est
 avec la minute dans l'étude
 de M^{re} J.-C. Panet, du
 14 décembre 1762, - fait par
 Ignace Plamondon, ar-
 tisteur, - vidimée et dressée
 par P.-B. Casgrain, à
 Québec, 10 juin 1905,
 certifiée sur l'original.*

Carré des murs de la maison de Samos.

de l'artiste Canot, on constate que cette maison avec son aile concorde avec celle de Saint-Michel sur les lieux en 1759, telle que dessinée par Smyth, tandis que si on la compare avec celle de Samos d'après le plan de Plamondon, on ne peut trouver comment placer l'aile ni la batterie.

A un point de vue statégique, on ne saurait non plus monter efficacement une batterie à la maison de Samos, car elle se trouverait masquée des deux côtés pour enfler le fleuve et se bornerait à un feu de face plongeant et un peu trop loin de la cime du cap et du rivage. Comme telle, elle était incapable de battre l'Anse-du-Foulon et celle des Mères, tandis qu'en la plaçant au bout de la pointe de la terre de Saint-Michel, à la maison indiquée par M. Jacreau, elle domine et commande de là le fleuve de tous côtés.

De plus, on peut s'en rapporter à la relation de Lévis, qui, appelé au secours après la défaite et la mort de Montcalm, se fit rendre compte exact des causes de sa défaite. Quand il parle de l'attaque manquée de Bougainville pour reprendre dans la matinée le poste de la batterie dite de Samos et déloger le colonel Howe qui, avec son infanterie légère, s'en était emparé dès le point du jour, il indique avec certitude la maison Saint-Michel qu'il connaissait comme telle, et dans laquelle l'infanterie de Howe se tenait, dit-il, retranchée. Le chevalier Johnstone et Hervy Smith s'accordent avec Lévis pour placer cette batterie près de Sillery et Smith la nomme ainsi.

Pour en arriver au plus tôt à la prise de cette batterie et ce qui en fut la suite, nous ne nous arrêterons pas à mentionner la surprise du poste de Vergor qui la précéda; elle est trop connue. Il suffit de dire que quelques grenadiers et trois compagnies de l'infanterie légère commandés par le colonel Howe s'en était vite emparés. Ceux-ci se divisèrent ensuite, partie dans les bois à gauche pour protéger ce flanc, et partie à droite pour balayer le cime du cap où se réfugiaient les fuyards, tout en faisant feu sur les troupes du débarquement au bas. Aussitôt après que le premier convoi des troupes de Wolfe fut monté, en profitant de la côte devenue libre, et qu'il se vit établi sur les Hauteurs, son premier soin, après s'être formé en ligne en face du grand chemin et le dos au fleuve, fut d'envoyer attaquer la batterie qui, depuis le point du jour molestait sa descente, tirant sur ses bateaux et son escadre, particulièrement sur le dernier convoi de débarquement. La batterie se trouvait à environ un mille et demi de parcours de là en prenant le grand chemin et à la moitié de cette distance ou 1500 verges à vol d'oiseau.

Le brigadier-général Murray, avec le 58^{ème} régiment et l'infanterie légère de Howe, et deux déserteurs pour guides, furent immédiatement dépêchés pour la cerner. Howe prit le devant et Murray le suivit jus-

qu'à la lisière du bois. Là il posta le 58ème en travers du chemin qui menait à la batterie. Dans ce même temps, Wolfe s'étant aperçu que les troupes françaises se formaient en nombre sur la rangée des buttes à Neveu entre lui et la ville, rappela Murray qui revint aussitôt. Mais le même officier d'ordonnance n'ayant pu rejoindre à temps le colonel Howe, pour lui remettre le même ordre, poussa en avant, escorté de quelques-uns des grenadiers, et ayant pris un chemin de raccourci, ils arrivèrent au point Bonvoisin, sur le ruisseau Belleborne. Là ils essayèrent une décharge d'un canon qui y était monté et qui fut suivie de quelques fusillades des hommes du poste, lesquels sur riposte vigoureuse disparurent bientôt dans l'épaisseur des bois environnants. L'escouade passa outre et parvint avant Howe à la batterie qui se trouvait à la maison Saint-Michel. Celui-ci arriva juste à point pour la trouver abandonnée et les canons encloués. Alors il retourna rejoindre Wolfe, qui, sur son rapport, renvoya une garnison de 172 des mêmes hommes pour s'y retrancher et s'y maintenir.

Où était Bougainville alors? Avait-il repassé à gauche de la rivière du Cap Rouge? Le 13 au matin, de six à sept heures, la marée était toute basse, le gué bon, et il y avait en outre à son embouchure un bac qui traversait au moyen d'un câble. Le nommé Galarneau tenait le passage. (*Prévosté, 27 juin 1758, fol. 110.*)

On constate que le 7 septembre, on s'adresse à Bougainville comme commandant à Sillery; le 8, au Cap-Rouge, puis à Saint-Michel; le 9, il est à Saint-Augustin, n'ayant fait ce jour-là aucun mouvement à cause du mauvais temps; de même le 10, imitant en cela l'ennemi. Son camp est au Cap-Rouge, et il y est le 11, où Remigny lui écrit. A 5 heures du soir, Montcalm le croit là par la lettre qu'il lui envoie. Le 12, dans la matinée, il surveille les vaisseaux avec l'aide de la Rochebeaucourt et 130 hommes de sa cavalerie qui suivent la marée montante qui va à midi. Ce même jour, Cadet, qui y a le plus grand intérêt, s'adresse à lui comme étant au Cap-Rouge. Suivant l'auteur de *l'Événement de la Guerre*, p. 65, Bougainville n'était éloigné que de deux lieues du Foulon quand il apprit, à ce qu'il dit, la dispersion du poste de Vergor et la montée de Wolfe avec son armée déjà rangée en bataille devant la ville. Au reste, comme dès le point du jour on a entendu, des côtes de Beauport, la batterie de Samos, il est à croire que Bougainville a dû l'entendre aussi, même s'il se trouvait au delà du Cap-Rouge.

Suivant le *Journal abrégé d'un aide-de-camp*, Bougainville ne fut averti que par les fuyards des postes culbutés. La fusillade de ces postes avait cependant déjà averti la ville et l'armée. Vaudreuil écrit du camp à Bougainville à six heures et trois-quarts du matin pour

l'avertir. Lévis qui s'est trouvé en relation immédiate avec Bourgainville, dit que celui-ci fut informé tard le matin, ce qui est assez vague quant à l'heure.

Prenons ce que Lévis en a écrit, *Journal des Campagnes*, p. 210.

"M. de Bougainville n'ayant été averti que tard du débarquement des ennemis, commença à se mettre en mouvement avec environ 900 hommes seulement, marcha vers la maison Saint-Michel, qu'il trouva occupée. Il la fit attaquer par les volontaires de Duprat, mais sans succès, les ennemis y étant bien établis. Mais ayant appris à une certaine distance de l'armée ennemie que la nôtre avait été battue, il se replia sur la vieille Lorette et envoya demander à M. le marquis de Vaudreuil de nouveaux ordres."

"Nous perdîmes dans cette attaque plusieurs volontaires. Le sieur de Brignolet, lieutenant au régiment de la Sarre y fut tué, et le sieur de Rouvray, aussi lieutenant au même régiment, y fut grièvement blessé de deux coups de fusil. Cette attaque fut fort vive et nos troupes y montrèrent beaucoup de valeur. M. de Bougainville n'ayant pu se rendre maître de ce poste, prit le parti de le faire masquer."

Suivant la version du chevalier Johnstone, aussi bon expert qu'écrivain militaire, Bougainville, chargé d'empêcher le descente de Wolfe au-dessus de la ville, aurait suivi la flotte jusqu'à la Pointe-aux-Trembles, et au retour, aurait été averti sur les sept à huit heures du matin que celui-ci était monté sur les Hauteurs et ses troupes déjà rangées en bataille devant la ville. Il se mit en toute hâte à marcher sur lui avec ce qu'il avait de troupes en deça de la rivière du Cap-Rouge, environ 900 hommes, en suivant le chemin des hauteurs et pour aller rejoindre Montcalm. Il s'arrêta en route, ayant trouvé devant lui une maison (Saint-Michel) barricadée et défendue par une forte garnison; il espérait la faire prisonnière. Le Noir, capitaine du régiment de la Sarre, alla l'attaquer de front avec la compagnie des volontaires de Duprat. En dépit de ses efforts et de sa charge impétueuse, il dut reculer, ayant perdu plus de la moitié de sa compagnie et reçu lui-même deux blessures. Mais Bougainville étant résolu à reprendre ce retranchement pour ne pas le laisser derrière lui, attendit l'arrivée de deux petites pièces du Cap-Rouge pour le forcer; or, par inadvertance, les boulets, dit-on, auraient été oubliés là. Quand Bougainville revint ainsi à la charge, ce n'était pas les boulets qui manquaient, mais les gargousses qui ne faisaient pas: elles n'étaient pas du bon calibre. Force fut d'abandonner l'assaut.¹

¹ On aurait pu dire que tout conspirait contre Montcalm qui venait d'écrire à Bougainville l'avant-veille, 11 septembre: "Jacau (celui-ci était Jacot Fiedmont, capitaine d'artillerie) croit s'être trompé en vous envoyant

Si l'on en croit le *Journal Abrégé d'un A. de C.*, les deux officiers, qui commandaient en cette occasion les cent volontaires, furent abandonnées par la plus grande partie de leur détachement, et restés avec dix-huit soldats, furent écharpés et faits prisonniers.

Après cet échec, Bougainville tenta de rejoindre le champ de bataille, mais il arriva trop tard, la journée était perdue. Townshend se retourna contre lui avec deux pièces de canon et le força de se replier sur Lorette. La même mésaventure arriva à Townshend pour ses boulets. Ils étaient trop petits et il fallut pointer haut les canons. Que de légers incidents peuvent affecter le sort d'une bataille!

Le temps que Napoléon perdit pour s'emparer d'une habitation fortifiée permit à Wellington de se reconnaître et à Blücher d'arriver à son secours, l'après-midi de Waterloo.

Pourtant les dispositions de Montcalm pour repousser toute descente de Wolfe au-dessus de Québec avaient été bien prises et étaient suffisantes; car ses postes étaient tous biens garnis et stratégiquement disposés aux bons endroits et aussi pour former une chaîne complète, comme on l'a vu ci-dessus. Depuis, le 6 septembre il écrit à Bourgainville, "Voilà encore 200 grenadiers que je passe à la batterie de Samcs "à votre disposition." Malheureusement, Vaudreuil remplace ce même jour par Vergor le brave de St-Martin qui tenait la garde de l'Anse-des-Mères et celle du Foulon avec 100 hommes. En tout, il y avait alors de Québec au Cap-Rouge, 500 hommes, et environ 1,500 autres surveillant au-dessus. En sus, Montcalm avait établi le même jour le Guienne pour stationner en réserve sur le grand chemin derrière Saint-Michel et Sillery, afin d'être à porté de secourir la droite et la gauche au besoin.

Vaudreuil intervint encore pour faire rentrer le Guienne le lendemain "dans la crainte, dit-il, qu'étant un corps pesant, il écraserait en "poursuivant les marches de Bougainville; et quant à le laisser à l'Anse-des-Mères, cela ne se peut, continue-t-il, car il n'y a pas de bois" (pour se cacher). Le 12, Vaudreuil donne le contre-ordre de laisser le Guienne aller se poster dès le matin sur les Hauteurs. "Nous y verrons demain," dit-il. Ce demain assura le triomphe de Wolfe.

Et Vergor qui, avec une douzaine d'hommes et des bâtons et des pierres auraient pu rejeter au bas du cap n'importe quels assaillants, (*Johnstone, Hades, p. 10*) dormait!

"des gargousses..... craint que celles reçues ne soient pas de calibre." Cf. *Doughty, Siege of Q., Vol. IV, p. 125, lettre reproduite.* On ne peut s'empêcher de conjecturer ce qu'une forte diversion de ce côté, en queue de Wolfe, aurait pu amener de changement dans le résultat de la bataille qui, moins d'une heure après allait être livrée.

Alors que Wolfe, pressé par l'amiral décidé à partir, venait de promettre au Conseil de guerre à bord du *Sutherland* que, du moment qu'on tirerait quelques coups de fusil sur ses soldats à l'assaut, il abandonnerait sa tentative ! !

On voit qu'il ne s'en fallait que d'un cheveu en cette occasion, comme en plusieurs autres faciles à signaler, pour faire échouer toute la campagne de cette année contre le Canada. Pour nous, Canadiens, descendants des glorieux vaincus, qui nous inclinons devant les décrets de la toute puissance du Dieu des armées qui tient en ses mains les destinées des nations, nous n'avons qu'à remercier sa divine Providence, qui, par des moyens inaperçus alors, nous a fait passer d'une position désespérée, et pour notre plus grand bien, sous la domination anglaise, et nous a finalement assuré une noble liberté. Elle nous a sauvés par là-même des désastres et des malheurs qui ont accablé et continuent d'accabler la France depuis au-delà d'un siècle.

II.—*Nos trois cloches.—Poème rustique.*

Par M. PAMPHILE LE MAY.

(Lu le 22 mai 1906.)

I.

Dans les brumes d'antan, les jours de mon enfance
Ont sombré, mais parfois je m'arrête, et je pense
Au calme bienfaisant qui les enveloppait.
Je ne connaissais rien, et rien ne m'occupait,
Hormis les chants d'un bois, les sables d'une grève,
Les parfums d'une fleur. Si quelquefois un rêve
Essayait d'ouvrir l'aile et de m'emporter loin,
Emu, je regardais, dans les frissons du foin,
Au ruisseau qui les baigne, au bois qui les abrite,
Les boutons d'or, l'iris, le thym, la marguerite,
Et je disais au rêve ailé :

" Je suis aussi

Une humble fleur des champs, laisse-moi vivre ici."

En ces jours reculés, dans nos paroisses riches,
Au milieu des sillons, du pacage et des friches,
Au-dessus des forêts même, déjà montaient
Bien des clochers bénis où nos espoirs tintaient.
La cloche, en sa lanterne, était fort solitaire.
Elle aimait à chanter. Rien ne la faisait taire,
Ni les neiges de mars, ni les ardeurs de juin.
Parfois ses longs sanglots nous disaient un chagrin,
Elle sonnait, parfois, des couplets de jeunesse.
Nous aimions à l'entendre. Il faut que l'on connaisse,
Quand monte vers le ciel un sonore tinton,
Si la joie ou le deuil entrent dans le canton ;
Si quelque nouveau-né reçoit l'eau du baptême,
Ou si l'un d'entre nous a dit l'adieu suprême.
Elle prenait aussi, dans les jours pluvieux,
Le timbre nasillard d'une chanson de vieux ;
C'était lorsqu'en hiver la pluie, après le givre,
Gelait comme des pleurs sur ses lèvres de cuivre.

Depuis un an peut-être une rumeur volait,
 Mourant et renaissant comme un cri de tolet
 Quand la rame déchire, en son rythme sévère,
 Le sein des flots. Chez nous, un bruit qui persévère
 Prend toujours la couleur de quelque vérité.
 Or, plusieurs affirmaient avec autorité
 Que le curé lui-même, une âme un peu lyrique,
 Verrait avec plaisir notre vieille fabrique
 Donner l'exemple, agir, piquer de l'aiguillon,
 Et monter au clocher le premier carillon.

On parlait de cela tout bas, tout haut, ensemble...
 "Un carillon, c'est beau sans doute, mais il semble
 Que Dieu goûterait mieux l'accord de nos esprits,
 C'est moins coûteux, bien sûr, et c'est d'un plus grand prix.
 Le plaisir agitait l'âme douce et mystique
 Qui voit dans chaque temple un céleste portique,
 Mais un amer dépit troublait le sermonneur
 Qui prétend qu'on perd tout quand on donne au Seigneur.

Le voile fut levé tout à fait. Un dimanche,
 Avec un geste altier qui déploya la manche
 De son large surplis éclatant de blancheur;
 De la chaire où sa voix avertit le pécheur,
 Stigmatise le tiède et console le juste,
 Le curé déclara que Dieu, le Maître Auguste,
 Pouvait être loué par les sons de l'airain,
 Comme il l'est par la voix du peuple souverain;
 Qu'il fallait aujourd'hui, sans craindre les reproches,
 Mettre, dans le clocher vaillant, trois belles cloches
 Qui diraient nos douleurs, nos plaisirs, notre amour,
 Et pleureraient sur nous à notre dernier jour.

Il se fit tout à coup, sous la voûte, un murmure
 Pareil au bruit du vent dans l'épaisse ramure,
 Et l'auditoire entier s'agita dans les bancs.
 Plus de doute, les mots tombaient très clairs, très francs.
 Un nouveau marguillier, notre voisin Tancrède,
 Un dissident par goût, prit l'air dur, le ton raide
 Qu'il prenait au conseil dans nos fréquents débats;
 Et saint Louis, dit-on,—je ne l'affirme pas—
 Le bon roi saint Louis, patron de la paroisse,
 Dans son cadre doré laissa voir de l'angoisse.

Le trouble ne dura qu'un moment. Par degré
Descendit de nouveau le silence sacré.
Peut-être que chacun se faisait la promesse
De dire sa pensée, au sortir de la messe.
Mais le curé, toujours charitable et plaisant,
Ajouta quelques mots, et ce fut suffisant.
Comme sur une source, au champ, l'on voit les bêtes
Pencher leurs fronts, ainsi s'inclinèrent les têtes
Un peu dures, parfois, de ses bons paroissiens.
Il avait dit ceci :

Jésus aima les siens,
Et c'est sa charité qu'en vos âmes je sème.
Le beau, comme le bien, mène au Dieu qui vous aime.
Embellissez le temple et Dieu vous bénira ;
Faites chanter le bronze... et le curé paiera.

II.

Voici l'automne. Il est comme un vieillard agile
Qui descend à grands pas de nos coteaux d'argile,
Avec sur son épaule une gerbe de blé.
Il est comme un ruisseau qui va, souvent troublé
Par le rameau qui tombe ou l'agneau qui s'abreuve,
Se jeter triomphant dans le sein du grand fleuve.
C'est le temps des labours, c'est le temps des guérets,
L'éteule a voilé d'or plus d'un clos, les forêts
Ont dénoué déjà leurs discrètes ceintures.
Dans les champs moissonnés que nos longues clôtures
Enlacent, semble-t-il, comme un traître réseau,
Le travailleur se hâte. Au logis, le fuseau,
Devant une fenêtre ouverte, tourne et gronde.

Tancrède labourait. Une lumière blonde
Noyait l'herbe. On eut dit des reflets printaniers.
La terre allait remplir de nouveau les greniers,
Et la paix descendrait dans toutes les demeures.
Tancrède aurait voulu que le jour eut plus d'heures.
Il savait tenir ferme et droit un mancheron.
Quelquefois cependant il lâchait un juron,
Et l'éclair de son âme allumait sa paupière ;
C'était lorsque le soc effleurait une pierre,
Et faisait quelque peu dévier le sillon...
Il était un artiste en labour, ce brouillon.

Jeannette le suivait à sa besogne rude.
 L'école, pensait-il, en ferait une prude...
 Puis, elle avait dix ans, savait lire et compter.
 Et les enfants, au reste, il faut bien les dompter,
 Si l'on veut que plus tard, en face de l'ouvrage,
 En face de l'épreuve, ils aient quelque courage.
 Tancrède était compris. La pauvrete croyait
 Qu'elle devait souffrir pendant que l'on choyait
 Sa sœur plus belle. Aussi, jamais une réplique,
 Jamais !

Elle "touchait," ce jour-là. Je m'explique.
 Mais vous savez encor, fiers enfants de nos bourgs,
 Ce que c'est que "toucher" dans le temps des labours.
 Tête au vent et pieds nus, elle tenait les guides
 Et fouettait de sa hart le dos des bœufs placides ;
 Elle allongeait le pas, trottinait de bon cœur,
 Pour suivre la charrue et le vieux laboureur.
 La poussière souillait ses petites mains blanches.
 Elle comptait toujours, rendue au bout des planches,
 Dans la vaste prairie un sillon noir de plus,
 Un rayon vert de moins. Mais, soucis superflus,
 La tâche d'aujourd'hui ne peut être achevée
 Que bien tard. Il faudra toute la relevée.

Tancrède sentait bien que son front se mouillait.
 Il se dressait souvent, et son regard fouillait
 Les grêles peupliers qui cachaient mal l'église,
 Et ses clochers plus hauts que leur ramure grise.
 Ce jour-là, bien des gens, endimanchés, ravis,
 Etaient venus s'asseoir dans l'ombre du parvis.
 Or, dès la matinée, à la lueur des cierges,
 Sous leurs manteaux fleuris, dans leurs robes de vierges,
 Les cloches, toutes trois, pareilles à trois sœurs,
 Avaient eu le baptême. A Dieu, dans les hauteurs,
 Elles pouvaient parler car leur voix était pure.
 Marraines et parrains, très fiers, avec mesure
 Avaient mis leurs écus dans le plateau d'argent.

Tancrède, marguillier nouveau, se rengorgeant,
 Etais allé s'asseoir aussi, dans tout son lustre,
 Sur un siège du chœur, au milieu du balustre ;
 Mais il avait ensuite enlevé le gilet,
 Endossé la bougrine et repris le boulet.
 Il disait maintenant à son enfant docile :

“ Les cloches sonnent tard... C’est donc bien difficile
De les pendre là-haut à leur solide essieu...
Tiens ! j’entends quelque chose enfin ! Ecoute un peu.
Ecoute, ma Jeannette, oui, voilà que ça sonne !...
Tu ris, petite, et moi, c’est drôle, je frissonne.

Jeannette souriait. Il ôta son chapeau,
Et, s’essuyant le front, il murmura :

“ C’est beau !

III.

A mon tour, ce soir-là, par la sente des chaumes
J’amenaï le troupeau. Je crus que dans leurs dômes
Les bois berçaient des chants nouveaux. C’étaient des sons
Mieux cadencés encor que nos airs de chansons.
Le dirai-je ? Jamais, dans nos rustres domaines,
N’avaient ainsi clamé l’Angélus. Quel émoi
Fit alors tressaillir mon âme ! Devant moi
Les génisses, les bœufs, qui marchaient à la file,
N’avaient plus maintenant leur allure tranquille,
Mais semblaient délirer de plaisir. Leurs fronts roux
S’élevaient tour à tour en des mouvements fous
Que scandaient à la fois leurs orgueilleuses cornes.

Une fermière, au loin, près des étables mornes,
Appelait son troupeau. L’appel était pressant,
Un peu rude tantôt et tantôt caressant,
Mais bétail et berger ne voulaient pas entendre,
Car c’était fête au champ.

Alors je vis s’étendre

Des vols capricieux sur les grands bois voisins.
Les oiseaux me semblaient grisés par les raisins,
Et le soleil couchant, qui s’échappa des brumes,
Fit jaillir des rayons de leurs mouvantes plumes.

Et le dirai-je aussi ? Je vis, en même temps,
Voltiger sur les prés, comme aux jours du printemps,
Des papillons poudrés d’or et des libellules.
Je vis des grillons noirs qui fuyaient leurs cellules,
Et des criquets gaillards qui chantaient l’oraison,
Comme ils font en été, pendant la fenaison.

Et tout près, dans le champ que labourait Tancrède,
Les bœufs ne marchaient plus. De leur narine tiède
Ils soufflaient doucement une tiède vapeur.
Le front bas sous le joug, les traits ballants, sans peur
De la harte qui tombait sur leur croupe indolente,
Alors qu'ils tiraient mal ou de façon trop lente,
Ils paraissaient dormir ou rêver. Puis, debout
Contre le clos de cèdre, et, regardant partout,
Anxieux, agité, comme un homme qui cherche,
Tancrède ! Le soleil scintilla sur la perche
Où s'appuyait son bras. Et je l'ai vu, le vieux,
Sourire à la féerie en s'essuyant les yeux.

Et pendant ce temps-là, dans le labour, tout proche,
L'enfant s'était couchée, un peu lasse. Une roche
Que la charrue avait effleurée en passant
Lui servait d'oreiller. Un trèfle encor naissant
Se cachait sous ses pieds frileux. Des chicorées
Penchaient leurs fleurs d'azur sur ses boucles dorées.
Sous sa tête mutine et presque belle alors,
Elle avait replié ses bras. Et, sans remords,
Un ange d'un baiser avait clos sa prune.
C'était l'oiseau qui dort la tête sous son aile,
Fatigué de voler. Dans cet instant de paix
Elle rêvait, l'enfant, à ses bœufs sous le faix,
A ce sol éventré par de longues blessures,
A ce vieux laboureur tenant, de ses mains sûres,
Et tant qu'il fera jour, les manchenons de bois,
Et tout lui semblait noir, lamentable, sans voix.

Mais alors tout à coup, dans le deuil de la terre,
Elle voit la prairie encore froide, austère,
S'étendre, s'élargir jusques à l'horizon,
Et les sillons obscurs qui coupent le gazon
Deviennent radieux. Ils montent vers les nues.
Et trois anges, chantant des stances inconnues,
Apportent la semence à ce labour divin.
Leur geste est solennel. Tout effort serait vain
Pour dire les accents qui tombent de leur bouche.

Jeannette se réveille et, de sa rude couche,
Elle crie au vieillard qui s'avance songeur :
“ Quel beau rêve j'ai fait ! ”

Puis, fixant la rougeur
Du couchant où flottaient les feux du crépuscule :

“ Je les vois, les entends, là sur le monticule !...
Ils chantent en semant pour le ciel !... Ils sont trois !

Nos trois cloches sonnaient pour la première fois.

III.—*Le Commerce de France avec le Canada avant 1760.*

Par M. BENJAMIN SULTE.

(Lu le 23 mai 1906.)

La nouvelle qui se répandit, au printemps de 1761, que l'Angleterre était prête à faire la paix avec la France produisit un mouvement dans les chambres de commerce de ce dernier royaume pour savoir si l'on devait demander la restitution du Canada. Nous allons voir ce que disaient en cette circonstance Dunkerque, Lille, Rouen, le Havre, Granville, Saint-Malo, Nantes, Bordeaux, Lyon, Bayonne, Marseille, la Rochelle.

Il n'est pas nécessaire de raconter ici comment se faisait le commerce de la France avec le Canada durant le siècle qui suivit la fondation de Québec, puisque notre dessein est de concentrer l'attention du lecteur sur les dernières années de la période française; néanmoins, quelques notes concernant le trafic des pelleteries semblent à leur place au début de cette étude, afin de nous guider dans l'interprétation des écrits de 1761 qui forment la majeure partie, et toute la nouveauté, de ces quelques pages.

I.

Voici un tableau qui date de 1665. A cette époque les Sauvages échangent avec les Français un castor pour l'un des articles suivants: 1 petit capot, 2 livres de poudre, 4 livres de plomb, 2 épées, 2 tranches, 2 haches, 8 couteaux à manche de bois, 10 couteaux jambettes, 12 fers de flèches, 25 alènes. Deux castors pour un moyen capot, trois castors pour un grand capot ou 1 couverture à l'iroquoise, quatre castors pour une couverture de ratine, six castors pour 1 couverture blanche de Normandie, ou 1 fusil.

Dans la correspondance des gouverneurs et intendants, année 1689, on trouve de curieux détails: Les Anglais n'ont pas de tabac noir du Brésil; ils traitent de celui de Virginie, à discrétion, avec les Sauvages. Les Français vendent aux Sauvages les menues marchandises, mais les Anglais les donnent à ceux-ci. Les Anglais ne font pas de distinction entre les castors; tout est pris à 50 pour 100 plus haut que chez les Français; en outre, leurs marchandises valent au delà du double de celles des Français. On donne aux Sauvages:—

	Montréal.	Albany.
1 pot d'eau-de-vie pour 1 castor	- - - -	6 pots
8 livres de poudre pour 4 castors	- - - -	1 castor.
1 fusil pour 5 castors	- - - -	2 castors.

	Montréal.	Albany.
40 livres de plomb pour 3 castors	- - - - -	1 castor.
1 couverture rouge pour 2 castors	- - - - -	1 castor.
1 couverture blanche pour 2 castors	- - - - -	1 castor.
1 gros capot pour 2 castors	- - - - -	1 castor.
4 chemises pour 2 castors	- - - - -	1 castor.
10 paires de bas pour 2 castors	- - - - -	1 castor.

Prenons quelques extraits de la correspondance échangée entre le ministre des colonies et le gouvernement du Canada, de 1716 à 1718; on y trouvera un aperçu du système adopté par les Français à l'égard du commerce avec les Sauvages: "Le marquis de Vaudreuil espère que Sa Majesté voudra bien envoyer cette année en Canada pour trente mille francs de présents aux Sauvages, et continuer tous les ans à y envoyer ceux qu'on a coutume de leur donner... Il serait à propos d'envoyer tous les ans en Canada trente milliers de poudre. Cette marchandise est la seule que les Sauvages estiment mieux que celle des Anglais. Les Sauvages en consomment vingt à vingt-cinq milliers tous les ans; le surplus servirait à faire un fond, crainte d'en manquer si nous venions à avoir une nouvelle guerre avec les Anglais. Il faudrait ordonner de la part de Sa Majesté qu'on ne vendît au magasin que trente sous la livre de poudre, comme on le faisait en 1712, et non pas quarante-cinq comme à présent. Il faudrait aussi, tous les ans, soixante milliers de plomb et six cents fusils de chasse. Les Sauvages les connaissent et n'en veulent point d'autres que ceux de Tulle.¹ Il est plus avantageux d'acheter ces articles en France qu'en Canada, où ils coûteraient une fois plus, pourvu que ceux qui en seront chargés ne fassent pas comme les années précédentes où l'on a remarqué qu'on les comptait plus au roi en France que les marchands du Canada ne les vendaient... M. de Vaudreuil serait très mal reçu des Sauvages s'il arrivait (les visiter) sans avoir de quoi leur donner les présents nécessaires, et courrait le risque de perdre la confiance qu'ils ont en lui, confiance dont il a besoin pour pouvoir terminer les différends que ces Sauvages ont entre eux. Les Anglais même, qui ne cherchent que le moyen d'éloigner les Sauvages de nous, ne manqueraient pas de saisir cette occasion et de leur faire entendre qu'on ne fait aucun cas d'eux en France. On sait trop combien l'alliance des Sauvages avec les Anglais serait préjudiciable au Canada et combien en souffrirait son commerce."

Son commerce de fourrures.... Il ne s'en faisait presque pas d'autres. La colonie agricole ne comptait pas, l'industrie non plus et c'est ce qui avait fait dire à La Hontan (1686) que le Canada n'existait

¹ Ville du bas Limousin qui devait avoir la Rochelle pour port de mer.

que par le castor. Ceci donnerait à penser que l'on s'appliquait à vendre aux Sauvages des marchandises à plus bas prix que les Anglais, pourtant le contraire avait lieu et, pour combler la différence, on avait inventé les "présents annuels," expédient précaire, et humiliant en ce que le roi de France faisait tout bonnement acte de soumission aux tribus. En outre, certains effets, étant de meilleure qualité et coûtant moins cher à Londres qu'en France, on les achetait aux Anglais pour gagner davantage sur le trafic des pelleteries.

"Il est impossible d'empêcher les Sauvages d'aller chercher des éscarlatines chez les Anglais... Pour empêcher le commerce avec la Nouvelle-Angleterre, Sa Majesté prend soin de faire envoyer des éscarlatines dans la colonie pour en fournir aux Sauvages que le désir d'avoir de pareils effets attirait chez les Anglais... En sus, le Conseil vous envoie copie de la facture de deux cents pièces d'éscarlatines qu'il a fait acheter à Londres." Le ministre écrivait à son tour: "Vous recevrez (à Québec) deux pièces d'éscarlatines de la manufacture des sieurs Gely, de Montpellier;¹ elles sont envoyées pour échantillon."

II.

Entrons dans notre sujet. L'examen d'un mémoire rédigé vers le temps de la prise de Québec va nous donner des renseignements plus précis sur plusieurs points. Par exemple, une barrique de vin payée cinquante francs en France et vendue trois cents francs en Canada ne rapportait au marchand que vingt-trois francs de bénéfice et encore faut-il déduire sur cette dernière somme l'intérêt du retard dans le paiement des lettres de change qui souvent l'absorbait toute entière.

"Si l'on objectait, dit ce mémoire, que les marchandises sèches payaient moins de fret, n'étant pas d'un aussi grand encombrement que les liquides, l'on répondra que le prix des assurances montera davantage, parce que une balle de marchandises de l'encombrement d'une barrique vaut en espèces mille écus. L'on convient, cependant, que ceux qui n'ont point fait faire d'assurance et qui se sont exposés aux risques ont gagné considérablement lorsque leurs marchandises ont eu le bonheur de se rendre. Le risque qu'ils couraient de tout perdre rendait leur profit bien légitime, surtout dans un temps où de vingt navires qui partaient pour le Canada, il ne s'en rendait que six.

"Il ne faut pas, d'ailleurs, comparer le commerce des colonies à celui qui se fait en France. Si l'on manque, dans une ville du royaume, de quelque espèce de marchandise l'on est assuré de la trouver dans une

¹ La Provence et le Languedoc produisaient abondamment la graine qui donne la teinture écarlate, mais il faut croire que les étoffes de cette couleur se fabriquaient plutôt en Angleterre qu'en France.

ville voisine. Les colonies n'ont pas la même ressource; souvent l'on y est forcé de prendre des marchandises dont on n'a pas besoin, pour avoir celles dont on ne peut se passer. La raison (de ceci) est fondée sur l'usage où sont les marchands du Canada de ne vendre jamais une seule espèce de marchandise. Leurs magasins contenant un assortiment de toute espèce, il faut que ceux qui achètent prennent un peu de chaque chose, sans quoi le magasin se déserterait et le marchand se trouverait dans la nécessité de vendre le reste avec beaucoup de perte.

“ Le commerce des colonies change de face à chaque instant, suivant la bonne ou la mauvaise fortune des armements. La prise d'un seul vaisseau pendant la guerre augmente souvent jusqu'à une valeur excessive le prix des marchandises. Le Canada, dans son commerce, a encore quelque chose de particulier et différent des autres colonies: la navigation n'y est point libre toute l'année, à cause du froid. Le temps pendant lequel les navires y séjournent est une espèce de foire où chacun fait ses ventes et ses achats. Dès que les navires sont partis, à la fin d'octobre, les marchandises augmentent de prix, parce que ceux qui les ont achetées des marchands forains pour les revendre doivent naturellement y gagner. Ce gain est plus ou moins fort suivant les circonstances de la guerre ou du plus ou moins de consommation et de la nature du payement. Les circonstances fâcheuses dans lesquelles s'est trouvé le Canada par les suites de la plus longue guerre, faisaient hausser chaque jour le prix des marchandises. L'eau-de-vie s'est vendue jusqu'à 200 francs la velte, ce qui fait 25 francs la pinte. Le lard salé, qui valait originairement, c'est-à-dire avant 1755, quinze sous la livre, a valu dans la suite jusqu'à six francs. Un chapeau de laine, des plus communs, qui vaut quarante sous en France, s'est vendu quarante et cinquante francs, et les autres marchandises en proportion. Les pertes continuelles augmentaient le rareté chaque jour, et le décri des espèces a achevé la ruine.”

Le ministre Berryer, à qui l'on demandait des troupes pour soutenir la lutte au Canada (1758) répondit en faisant allusion à la guerre malheureuse que la France avait engagée en Allemagne contre la Prusse et l'Angleterre: “ Lorsque le feu est à la maison on ne s'occupe pas des écuries,” à quoi Bougainville riposta: “ Personne ne dira que vous parlez comme un cheval.” Berryer se consolait de la perte de la colonie, car, disait-il, “ ce sera une charge de moins, le Canada ayant coûté cent millions de francs depuis le début de la guerre.” M. Emile Garnault ajoute à ceci: “ D'après lord Chesterfield, les Anglais n'avaient pas hésité à sacrifier quatre-vingts millions sterling, soit deux milliards de francs, pour nous dépouiller d'une conquête dont ils devinaient l'avenir.”

III.

M. Emile Garnault,¹ secrétaire archiviste de la chambre de commerce de la Rochelle, a publié, depuis quinze ans, divers ouvrages de haute valeur sur le commerce maritime de cette ville au cours des trois derniers siècles. Le Canada y figure souvent et l'on est tenté d'en citer tous les passages qui nous intéressent, mais bornons-nous à grouper ceux qui appartiennent à la séparation de notre pays d'avec la France. Il est aisé de faire ressortir, grâce aux documents mis au jour par M. Emile Garnault, l'attitude prise par les armateurs et les manufacturiers du royaume, en 1761, lorsque la question de céder notre pays à l'Angleterre se présenta comme un moyen de rétablir la paix avec cette puissance. Chacun sait que la cour de Versailles parut consentir à ce sacrifice d'un cœur léger, mais au fond, c'était à regret; il le fallait bien, cependant, pour sortir d'une impasse où l'imprévoyance des dix ou douze dernières années avait acculé l'administration royale. À part les auteurs de cette situation déplorable qui cherchaient à donner le change à l'opinion publique en disant que nos arpents de neige ne valaient pas la peine qu'on s'en occupât et ceux qui disaient: "Une fois la paix faite, le roi dormira tranquille," il y avait, chez les ministres, une assez bonne perception de la faute commise. De tous temps il a existé, en France et en Angleterre, un parti hostile aux colonies. L'histoire en est longue. Nous avons vu, il y a quarante ans, M. Bright et autres entraîner le parlement vers la séparation, tout comme avait fait le groupe de politiciens dont Voltaire se constituait l'interprète en France, non pas qu'il fut un chef, mais parce qu'il lui plaisait de parler et d'écrire dans le sens de ce parti. C'est à tort que nous lui avons prêté le rôle d'inspirateur dans cette cabale: il faisait comme tant d'autres qui avaient de fausses idées sur l'importance des possessions lointaines. Quand il disait: "Je voudrais voir le Canada au fond de la mer Glaciale," il n'inventait pas l'expression, il ne faisait que la répéter après l'avoir entendue. Son influence était à zéro, mais il n'était pas seul de son côté. Lorsque lord Dufferin fut nommé gouverneur du Canada, un membre du parlement lui dit: "J'espère que vous allez nous débarrasser de ce Dominion," à quoi l'autre répondit: "Non, pas! je vais le rattacher à nous davantage." Ne nous étonnons point de ces divergences de sentiments ou de calculs qui ont toujours existé.

Ce que nous ne connaissions pas jusqu'à présent, c'est la note du commerce qui avait dû se faire entendre dans le débat, puisque les intérêts de ce dernier, fort compromis, devaient avoir soulevé des plaintes

¹ La famille de F.-X. Garneau, notre historien national, était aussi de la Rochelle.

dont l'écho semblait perdu pour nous au milieu du fracas de ce grand désastre. M. Emile Garnault réveille aujourd'hui les voix qui avaient plaidé, dans quelques villes de l'intérieur du royaume et le long de tout le littoral, contre la cession d'abord, et ensuite pour tâcher d'en amoindrir les rigueurs.

Après le retour en France des troupes et des bureaux du Canada, l'automne de 1760, des négociations avaient été entamées avec la cour de Londres pour rétablir la paix en Europe et, au mois de mars suivant, Pitt déclara que l'on pourrait arriver à une entente sur la base du transfer de notre colonie. Cette condition fondamentale fut trouvée tellement onéreuse que Louis XV jugea à propos de faire imprimer et de répandre les pièces diplomatiques échangées en cette occasion entre les deux couronnes, afin de montrer qu'il se voyait dans l'impossibilité d'offrir un refus à de pareilles prétentions. Le cas était sans précédent, je crois, car l'habitude des rois de France n'était pas de donner au peuple des explications de cette nature.

On se rend compte de la gêne qu'inspire une situation pénible chez un pouvoir qui commence à redouter les suites de ses égarements. Trente années avant la Révolution la crainte, sinon des masses, du moins de certaines classes de la nation, se faisait déjà sentir. Ceci ouvrait la porte aux représentations, aux discussions et la publication de ces pièces devenait quasi un appel à l'opinion publique.

En septembre 1761, toute espérance de paix s'était évanouie, mais Pitt sortait du ministère. Peut-être que ce changement ramènerait à bien l'état des affaires. Restait-il quelque espoir à la France? C'était le moment d'agir, même dans le doute. La chambre de commerce de la Rochelle qui, plus que toute autre, sentait retomber sur elle les conséquences de l'abandon du Canada, écrivit, le 10 novembre, aux chambres de commerce des grands ports et de quelques villes du centre de la France, les invitant à pétitionner le ministre des colonies et remontrer contre une cession absolue de la Nouvelle-France. Voici des extraits des réponses reçues durant les cinq semaines qui suivirent cette demande :

IV.

Lyon :—“ Nous ne saurions, dans cette occasion, nous réunir à vous, notre position étant différente de la vôtre et le commerce de Lyon n'ayant qu'un intérêt bien médiocre dans la conservation du Canada.” Cette note, qui n'a rien de national, se retrouve ailleurs.

Lille :—“ Nous sentons parfaitement combien est grande la perte du Canada pour la France et combien elle peut augmenter l'opulence de nos ennemis, mais toutes réflexions que nous pouvons faire à ce sujet nous sont d'autant plus douloureuses qu'elles ne nous laissent que le triste

regret de ne pouvoir y apporter aucun remède, puisque nous pensons que ce serait visiblement condamner ce que le roi et son conseil ont décidé.”

Dunkerque:—“ Pour vous seconder, nous nous proposons de faire un mémoire exact sur les richesses immenses que produit la pêche de la morue au royaume.”

Rouen:—“ Nous avons lu avec une sensibilité égale à la vôtre le recueil des négociations de notre cour avec celle d'Angleterre; nous sentons comme vous l'étendue et le prix des sacrifices que notre monarque a jugé à propos de faire; comme vous, nous sommes effectivement dans une province qui en sentira de fâcheux effets; mais, néanmoins, nous ne pouvons penser que le Conseil ignore l'importance d'une cession parce qu'il paraît se la dissimuler, ni que le roi, en rendant publiques ses négociations, ait prétendu consulter ses peuples et leur donner la liberté de lui faire des représentations. Nous croyons qu'il a seulement voulu les convaincre qu'il ne leur fait supporter le poids de la guerre qu'à regret et qu'il veut sincèrement la paix. Il ne pouvait pas en donner une preuve plus frappante.”

Le Havre:—“ Quelque extrêmes que soient les besoins de ce royaume, nous comprenons que c'est acheter la paix du plus pur de son sang que de la payer par la cession du Canada. Pénétrés des mêmes sentiments que vous sur l'importance de cette colonie, nous ne pouvons qu'applaudir au projet que vous avez formé de mettre sous les yeux de M. de Choiseul les inconvénients qui résulteraient de la perte d'un si beau pays, soit dans la décadence de l'agriculture, des manufactures, de la pêche et de la navigation, soit dans les avantages infinis que les ennemis retireraient de la possession d'une contrée si vaste et dont l'utilité et l'excellence paraissent être encore inconnues. Nous ne balancerions pas de seconder vos représentations par les remontrances les plus fortes si, nous renfermant de tout temps dans les objets qui tiennent uniquement au commerce, nous ne nous fussions pas imposés silence pour toujours sur les affaires de politique.”

Saint-Malo:—“ Nous avons lu, comme vous, avec une vraie douleur, le recueil des négociations entre notre cour et celle d'Angleterre et le sacrifice que le ministre voulait faire de la précieuse colonie du Canada. Le plan que vous vous proposez de suivre dans le mémoire que vous comptez adresser aux ministres nous a paru embrasser tout ce qu'on peut dire contre la cession d'une possession aussi importante; aussi nous le suivrons... Nous craignons bien que ce ne soit un parti pris et que les représentations ne servent de rien. Quoiqu'il en soit, nous aurons au moins la faible consolation d'avoir fait notre devoir.”

Granville:—" Nous avons été surpris et affligés de voir la perte du Canada et la privation de la pêche de la morue aux côtes de la grande baie de Gaspaye et de l'île Royale (cap Breton), de sorte qu'il ne resterait aux vaisseaux français que la faculté stipulée par le traité d'Utrecht (1713) de faire la pêche et la sécherie des morues sur une partie des côtes de Terre-Neuve, sans y pouvoir former aucune habitation pour profiter des pêches d'automne et du printemps. Vous concevez, sans doute, messieurs, que les Français étant ainsi réduits à ce que nous appelons la côte du petit Nord et à la partie ingrate de la côte de Terre-Neuve, située sur le golfe Saint-Laurent, la pêche de la morue doit tomber des trois-quarts, ce qui, outre le tort irréparable que nos villes respectives en souffriront, portera le coup fatal à la marine de France, étant prouvé que la pêche de la morue est une pépinière de matelots (tandis) que le commerce de l'Amérique et des Indes détruit plutôt qu'il n'augmente (l'instruction des matelots)... Ne trouveriez-vous point convenable, messieurs, de faire de très humbles représentations à M. le duc de Choiseul? Tout le monde connaît les bonnes intentions de ce seigneur pour le rétablissement de la marine et du commerce maritime. Il est possible que la cession du Canada et la renonciation à la plus grande partie de la pêche de la morue n'aient point été considérées dans leur vrai point de valeur, lorsqu'on les a proposées... Nous ne sommes pas fort au fait de ce qui concerne le Canada; nous ne pourrions toucher cet article que superficiellement. L'abandon des côtes de la grande baie de Gaspaye et de l'île Royale nous paraît de la dernière conséquence. Nous croyons que nos représentations devraient avoir pour objet de nous conserver les côtes poissonneuses où nous formons des habitations de pêcheurs qui profitent du printemps et de l'automne... Ne pourrait-on point faire valoir les intérêts de nos îles d'Amérique, qui consomment beaucoup de morues sèches qu'on serait forcé de tirer des colonies anglaises, les morues provenant des côtes que cette nation nous abandonne n'étant point d'une qualité propre pour l'Amérique."

Nantes:—" La cession d'une colonie telle que le Canada ne peut qu'être, sans doute, très préjudiciable au commerce de France. Nous l'avons senti comme vous, nous en avons gémi et nous avons déploré la cause d'un si grand sacrifice, mais telle est notre triste position qu'elle nous réduit à recevoir la loi. Sans marine, que peut la France? Pour arrêter les conquêtes d'un ennemi puissant, elle demande la paix: elle ne peut donc la faire avantageuse. Le Canada fut le motif de la présente guerre.¹ Depuis longtemps l'Angleterre machinait les moyens de réunir cette contrée à son domaine: elle la possède à titre de conquête

¹ Pitt avait dit qu'il occuperait tellement la France dans la guerre d'Allemagne que les Anglais pourraient s'emparer de l'Amérique du Nord.

et ses forces maritimes lui en assurent la possession. Elle est, d'ailleurs, trop ambitieuse et trop éclairée sur ses intérêts pour ne pas tirer partie de la supériorité de ses forces. Il est probable que l'Angleterre, avant de commencer les négociations, en a établi pour base la cession entière de cette colonie par la France et que celle-ci a été forcée d'y souscrire. Nous sommes d'autant plus confirmés dans cette idée que nous savons très positivement que le ministère, il y a plus d'un an, avait pris des informations¹ sur le Canada; qu'on lui avait fait sentir toute l'importance de cette colonie et les suites funestes qui résulteraient de sa cession... aussi le Canada fait-il la matière des premiers articles des mémoires respectifs fournis par la France à l'Angleterre, et encore ne suffit-il pas à l'ambition de celle-ci. Ces considérations nous portent à croire qu'il serait superflu, et peut-être indiscret, de faire des représentations directes sur cette cession; quelques ménagées qu'elles fussent, elles pourraient déplaire et même blesser le ministère. Il paraît avoir été attentif aux intérêts du commerce: la restitution des prises, la traite des noirs et la pêche de la morue ont été discutées. Sans répandre un mémoire, nous pensons qu'une lettre à M. de Choiseul serait plus en place. Sa vigilance pour le bien du commerce exige nos remerciements. En relevant la grandeur du sacrifice, on peut s'étendre sur l'importance du Canada et lui remettre sous les yeux combien sa cession serait préjudiciable au commerce."

Bordeaux:—"Notre chambre vous secondera dans l'objet des représentations... cependant quelques-uns de nous objectent... il pourrait ne pas paraître placé que les chambres de commerce représentassent dans des choses que les événements ont rendu affaires d'Etat... si le ministre, gagné par nos représentations, refusait la cession du Canada et que la paix ne pût se conclure qu'au prix de cette cession, nous aurions à nous imputer la continuation des calamités de la guerre..." Dans le mémoire de la chambre de Bordeaux adressé au duc de Choiseul le 22 décembre 1761, il y a: "Cette colonie fournissait en temps de paix au commerce de France deux objets considérables: 60 vaisseaux sortaient chaque année de nos ports pour y porter les choses propres à ses consommations; 150 autres y allaient pêcher la morue. Le chargement de ces 60 vaisseaux était composé de vin, d'eau-de-vie, de draperies fines et communes, de soiries, de dorures et généralement de tous les objets de luxe;² on en peut évaluer le capital à 10 millions et à 2 le profit qui

¹ L'un de ces rapports expose que le Canada une fois rendu à la France devrait servir de place d'armes d'où l'on sortirait pour conquérir la Nouvelle-Angleterre. La guerre, toujours la guerre.

² Notre petite population ne prenait qu'une partie de ces marchandises; la masse passait à la traite des pelleteries sur une étendue immense de territoire.

en résultait. Le produit de ces chargements était employé partie en lettres sur les trésoriers de Sa Majesté, et les dépenses que comportait le service du roi ¹ dans la colonie en étaient ainsi acquittées avec d'autant moins de frais, partie en pelleteries provenant de la chasse des Sauvages qui, devenant en France un objet de commerce, étaient dans le Canada une occasion de liaison avec ces mêmes Sauvages, que l'on a toujours utilement employés à la défense de la colonie; ² partie enfin était convertie en huile de loup marin et en morue provenant de la pêche des habitants. Tandis qu'un certain nombre de ces vaisseaux transportaient ces objets en France, les autres chargeaient des bois de charpente qu'ils apportaient aux îles. Ce n'est pas les seuls avantages que les îles en recevaient; ces mêmes vaisseaux, en augmentant le nombre de ceux qui s'y trouvaient déjà, faisaient diminuer le prix du fret, et la colonie remettait en France ses denrées à moins de frais. Les îles trouvaient aussi dans le Canada le débouché des tafias et des sirops, ³ débouché utile qui, joint à la circonstance de la diminution du fret, lie l'intérêt des îles à la conservation du Canada. Tel était l'état du commerce avant la guerre, mais ce n'est pas tout ce que le Canada pourrait fournir. Nous ne croyons pas déplacé d'en parler ici puisque, raisonnant sur le mérite de la colonie, il est également utile de voir ce qu'elle était avant la guerre et ce qu'elle pourrait devenir lorsqu'une paix heureuse l'aura rendue à la France. Le tabac croît parfaitement dans le Canada. Si la plantation en était encouragée, la colonie accroitrait en nombre d'habitants, en raison de ce que ses produits seraient multipliés en quantité et accrus en valeur. Cet encouragement dépend du fermier; ⁴ si les considérations qui le conduisent chez les Anglais pour y acheter le tabac ⁵ de la plantation ne sont pas telles que l'intérêt de la nation ne puissent bien les balancer, qu'il verse dans cette colonie, en achat de cette denrée, les sommes considérables qu'il porte chez l'Anglais: la colonie lui devra sa force essentielle, résultant de l'accroissement du nombre de ses habitants, et la nation les profits d'un nouveau commerce. Le Canada fournirait encore de la mâtire et du bois de construction; ce bois sec et attendu serait employé utilement dans nos chantiers; ainsi ménagé, il ne ferait

¹ Ceci veut dire la dépense publique de l'administration du Canada: gouverneurs, tribunaux, fonctionnaires, troupes, etc.

² Les subventions aux guerriers sauvages étaient énormes. Nos guerres avaient pour cause le désir des Français et des Anglais de s'emparer de la traite des fourrures.

³ En 1693 et par la suite, les documents officiels mentionnent des "quarts de melasse pour faire de la bière."

⁴ Celui à qui le roi accorde le monopole d'un certain commerce.

⁵ L'expression "tabac du Brésil" se rencontre souvent dans les dépêches officielles.

pas dans nos mains un moindre usage que chez les Anglais. Mais c'est lorsque le bois manquera en France que l'on goûtera cette ressource, si jamais on l'employait. Si le tabac devenait en Canada un objet d'agriculture, l'exportation de l'un et de l'autre rendrait nécessaire un plus grand nombre de vaisseaux et, de l'accroissement de la marine marchande, résulterait la force de la marine royale, fondée dans le plus grand nombre de matelots. On y cultiverait aussi avec succès le chanvre. Il ne manque, pour rendre cette colonie une des plus utiles, par la nature des choses dont elle est susceptible, que les bras pour cultiver la terre et fouiller les mines. Nous avons dit que 150 vaisseaux sortaient chaque année des ports de France pour aller pêcher la morue dans les mers du Canada; 10 à 12 mille hommes, employés sur ces vaisseaux, cherchent au fond des mers le capital d'un commerce solide par ses rapports avec les besoins de la vie et d'autant plus à considérer pour nous que notre morue, mieux préparée que celle des Anglais, ou préparée avec de meilleur sel,¹ en nous acquérant la préférence dans la vente, assure les profits de notre pêche. Ces mêmes hommes, exercés dans une navigation dure et pénible, deviennent d'excellent matelots... La continuation de la guerre ne peut manquer de faire sentir aux Anglais le besoin de la paix et réprimer cet essor imposant qui menace toute l'Europe. Cette nation, élevée sur ses conquêtes, compte vainement² ses flottes nombreuses, ses officiers de mer braves et expérimentés; sa force repose sur son crédit, qui dépend lui-même de la continuité du succès. L'inaction est perte pour elle; un échec peut devenir une révolution. C'est ainsi, monseigneur, que le commerce se représente l'importance du Canada et croit voir dans la continuation de la guerre les moyens de le recouvrer..."

Bayonne:—"Persuadés que le mémoire que vous avez préparé exprimera mieux que nous ne saurions le faire toutes les raisons qui s'opposent à l'abandon du Canada, nous ne pouvons que recommander à notre député de se joindre au vôtre pour les faire valoir auprès des ministres, mais nous pensons que les personnes qui tiennent les rênes de l'Etat se relâchent sur le Canada, bien plutôt par l'impossibilité de le reprendre que par le mépris qu'ils peuvent faire de cette colonie qui a coûté, il est vrai, à l'Etat, mais ne lui a coûté que parce qu'on l'a bien voulu; et l'on sent bien que, lorsqu'on voudra changer de maxime à cet égard, cette colonie pourra se soutenir toute seule et nous donner une utilité dont on verra avec mal au cœur les Anglais s'enrichir."

Marseille:—"En lisant le recueil des négociations qui a été rendu public, nous n'avons pas été moins sensibles et moins surpris que vous en voyant l'abandon que l'on faisait d'une colonie si utile. Ce serait,

¹ Le sel de la Rochelle, longtemps renommé au-dessus des autres.

² Avec vanité...mais non pas en vain.

comme vous l'observez fort bien, une perte immense et irréparable pour l'Etat et qui mérite la détermination que vous avez prise de présenter un mémoire à MM. le duc et comte de Choiseul, pour les informer de l'importance du Canada. Nous concourrons volontiers à seconder vos dessein. . .” Le 21^e décembre, la chambre de Marseille écrivait de nouveau : “ Quoique le Canada, presque toujours en guerre, n'ait pu augmenter ni améliorer son commerce, ni même permettre aux négociants de suivre et de découvrir de nouvelles branches, on sait que ce vaste pays consomme une grande quantité de nos vins et de nos eaux-de-vie, diverses denrées du crû de France, des draperies de toutes espèces, des toiles, et enfin des ouvrages de la plupart de nos fabriques.¹ Il nous fournissait, en retour, des peaux de castors, d'élans, de cerfs, de chevreuils, des pelleteries, des fourrures, la morue, l'huile de poisson, du saumon salé, du bois de construction, de charpente, de menuiserie, etc. . . Le Canada fournit aussi des farines et des pois à Louisbourg. Il compensait avec ces denrées celles de nos îles, avec lesquelles il faisait un grand commerce et, en 1750, nous avons vu ici un navire venant de Québec chargé de blé. Le débouché du Canada favorisait ici l'importation des laines du Levant et de Barbarie, qui s'accumulent aujourd'hui dans les magasins de la compagnie d'Afrique et dans ceux des particuliers. . . Ces laines, pour être mises en œuvre et manufacturées, occupent en Languedoc un peuple d'ouvriers auxquels la consommation du Canada donnait le travail et la subsistance: on en jugera par un seul article de cent mille² couvertures que le Languedoc fabriquait annuellement pour le Canada. Si nous entrons dans tous les détails, on serait effrayé du vide que la perte de cette colonie doit laisser dans la navigation et le commerce de la France; mais si on considère les avantages de la pêche dans la rivière, à Gaspée et dans les différents postes établis pour celle des loups marins et des marsouins, indépendamment de l'importante pêche de la morue qu'il sera difficile aux Français de continuer sur le grand banc de Terre-neuve, peut-on ne pas regarder vivement tout ce que nous abandonnerions à nos ennemis! Si les grandes dépenses que le roi a faites depuis quelque

¹ Draps écarlate et bleu. Serge du Poitou. Toile de Melis. Bas de Frise, bas de ratine. Couvertes de laine de Rouen, du Languedoc. La liste en est longue. Le mot “couverte” est employé dès 1665.

² Les couvertures de laine d'Espagne, fabriquées à Montpellier, en Languedoc, payaient 15 sous d'entrée au roi dans le port de Québec, ce qui, à raison de 3 pour 100 de la valeur de l'objet, met la couverture à 25 francs. Celles de Rouen payaient 13 sous, d'autres 9, 7 et 4, telles que fabrique de Coulonges (Poitou), de Bordeaux, et celles de ratine, de drap rouge, de poil de chien, à l'Iroquoise, etc. (Voir *Edits et Ordonnances*, I. 597, aussi les quatre volumes de *Documents de la Nouvelle-France*.) La grande quantité de ces couvertures s'explique par la traite avec les Sauvages, qui s'étendait au nord, au nord-ouest, ouest et sud, à 200, 400, 600 lieues de Québec.

temps au Canada peuvent effrayer pour l'avenir, on ne doit pas se dissimuler aujourd'hui que cette colonie bien administrée coûtera beaucoup moins et, pour s'en convaincre, il suffit de jeter les yeux sur les états des dépenses annuelles qu'on y faisait il y a vingt ans¹ et même pendant la dernière guerre. Toutes les places de commerce et les lieux de fabrique du royaume sont surchargés de lettres de change du Canada; leur objet et les malheurs du temps en on fait suspendre le paiement. Les armateurs qui ont reçu ce papier, pour le fret de leurs navires, les fabricants, en paiement de leurs marchandises, les négociants, en retour des effets qu'ils ont envoyés sur l'invitation du ministre, et les disposeurs, qui ont escompté les lettres de change, souffrent depuis longtemps... Nous vous prévenons que nous avons l'honneur d'envoyer cette réponse à M. le comte de Choiseul."

V

"On voit, par ces réponses," observe M. Emile Garnault, "que peu de représentations commerciales furent disposées à soutenir les réclamations de la Chambre de Commerce de la Rochelle, ville qui centralisait alors presque tout le commerce du Canada. On se préoccupait peu du sort de nos colonies en général, et l'on était porté à voir particulièrement le tort que pouvait faire à telle ou telle ville de France la cession de telle ou telle colonie." C'est-à-dire que, s'il existait quelque part ce que nous appelons l'esprit public, la forme du gouvernement l'étouffait. Alors, chacun pour soi.

La résistance que la Rochelle opposa au projet de cession fut précisément inspirée par l'intérêt local: se voyant en danger de perdre plus qu'aucune autre ville elle déploya une ardeur proportionnée au péril.

Celui qui tenait la plume au nom de la Rochelle et qui était, on peut le dire, l'âme de la chambre de commerce de cette ville, se nommait Jean-Baptiste Gastumeau, un lettré, membre titulaire de l'académie de la Rochelle depuis 1732 et son secrétaire perpétuel. Louis-Etienne Arcère, historien de la ville, dit en parlant de Gastumeau: "Je querellerais presque le commerce d'avoir ravi en partie aux muses un homme qui n'était fait que pour elles, mais en se dévouant au commerce il a travaillé avec tant, d'utilité pour sa patrie et pour le bien général que c'eût été un malheur qu'il n'eût été qu'un homme de lettres."

En novembre 1761, ce zélé défenseur du commerce et de la navigation s'adressait au duc de Choiseul, ministre de la guerre et de la marine, exposant que la suspension des rapports qui venait de se produire entre Versailles et Londres remettait la France au même point où elle s'était trouvée avant les propositions du printemps dernier, ce qui sem-

¹ Sous MM. de Beauharnois et Hocquart.

² Celle qui s'était terminée en 1748.

blait laisser encore quelque jour aux négociants du royaume pour s'expliquer "sur l'étendue et l'importance des sacrifices que l'ennemi exigeait de nous." En même temps, il priaït les diverses chambres de commerce de France de vouloir bien présenter des mémoires au même ministre, comme on l'a vu. Voici une autre note de lui qui appartient à cette démarche :

"Le Canada a pour ennemi non seulement ceux qui ne l'ont jamais connu et qui ne jugent des choses que par précipitation et par l'intérêt du moment, mais encore ceux qui l'ont perdu et qui voudraient mettre sur le compte de la fatalité les fautes qui ont précipité la chute de cette colonie. C'est de là que se sont élevés ces cris importuns qui, pour hâter la paix par le sacrifice du Canada, essayent d'en faire regarder la possession comme onéreuse, inutile, et fatiguent nos négociations de cette répétition continuelle : il faut faire la paix." A présent, voyons le mémoire de la Rochelle dans ses parties les plus intéressantes :

La Rochelle :—"La cession pleine et entière du Canada a été la principale condition du traité : elle fut arrêtée dès la première entrevue, sans résistance et sans modification et, sur cet objet, jamais la négociation n'a varié. D'où peut naître, on l'ose dire, cette espèce d'indifférence pour une colonie si vaste, si belle, si utile, la clef et la sauvegarde de l'Amérique ; colonie pour laquelle l'ennemi s'est épuisé d'hommes et d'argent et qu'il met au rang de ses plus riches et de ses plus brillantes conquêtes. Il y a eu, dans tous les temps, des personnes prévenues contre nos possessions de la Nouvelle-France. Dès les conférences d'Utrecht (1713) on fut disposé à les sacrifier toutes, et nous ne dûmes qu'à l'adresse et à l'habileté de nos négociations les débris qui nous en restèrent. C'était, disait-on, une colonie à charge qui ne se soutient que par l'argent du royaume et, par malheur, ce qui s'est fait en dernier lieu (1750-1760) en Canada n'a que trop fortifié ces idées... Qu'il nous soit permis de remettre sous les yeux du ministre une partie des maux que va causer à la France la perte du Canada, et l'état de force où il met l'ennemi pour tenter de nouvelles conquêtes... Trois millions et demi, répartis pendant quelques années par des mains pures, peuvent élever la colonie au plus haut point de grandeur. Sous l'heureuse administration de M. Hocquart (1729-1748) les dépenses n'allaient qu'à six ou sept cent mille francs. On ne suppose ces trois millions et demi que pour donner à la colonie les plus rapides accroissements.

"L'étendue du Canada offre, au premier coup d'œil, des possessions sans bornes. Plus vaste que l'Europe, il renferme près de mille lieues de pays, de l'Est à l'Ouest et, du Sud au Nord, on en compte beaucoup plus. Nos établissements et nos postes, dans ces immenses contrées, occupent déjà près de trois cents lieues de terrain en tous sens. Des forêts, des

lacs, des rivières sans nombre partagent ou arrosent un territoire fertile qui, participant de la température de presque tous les climats du monde, produit les fruits assortis à ces climats. La terre n'y compte pas les dons, elle les prodigue avec une sorte d'excès; le blé y vient presque partout et avec abondance; des pâturages excellents nourrissent des troupeaux nombreux; les lacs, les rivières fournissent à tous les genres de pêches des ressources inépuisables et toujours renaissantes. Les chasses des Sauvages accumulent de toutes parts ces peaux précieuses de bêtes fauves dont toute l'Europe a fait l'objet de ses commodités et de son luxe. L'air y est sain, la nourriture salubre, la population assurée par la fécondité des femmes et la longue vie des habitants; les hommes y sont bien faits, polis, sobres, braves, d'un tempéramment robuste, actifs et pleins de feu. La candeur, la bonne foi ont régné dans ces paisibles contrées; on n'y connaissait pas l'usage des clefs et des serrures et toutes les maisons s'ouvraient sans défiance à l'hospitalité—jusqu'à ce moment fatal où des hommes¹ nés pour la honte et le malheur de la France ont porté dans ce séjour de l'innocence et de la vertu tous les vices de l'ancien monde, le poison funeste de la cupidité, l'art perfide des fraudes et de la souplesse, la violence qui étouffe les cris de l'opprimé, l'irreligion qui fait taire les remords, l'adresse qui cache les rapines et dérobe le crime à la sévérité des lois. Sans doute que, pour voiler ces noirceurs, on ne manquera pas de rejeter la source des malheurs de la colonie sur la colonie même, dont la position et le fond se sont refusés² aux efforts qu'on a faits pour la garder. Mais est-ce la colonie qui a fait éclore le monopole avant la guerre et qu'on a depuis porté à l'excès? Cet agiotage insensé qui a écrasé toutes les subsistances et a exposé mille fois les troupes du roi à la disette au milieu de l'abondance? Ce goût d'intrigue et de fortune adroitement inspiré et soutenu pour attribuer à une espèce de fatalité le désastre affreux qui en devait être la suite? Cet esprit mercantile qui avait saisi jusqu'au simple soldat et enlevait au devoir³ une milice entière qui avait l'ennemi aux portes?

“Le Canada avait été longtemps dans une espèce d'oubli; ce n'est que depuis environ trente-cinq ans⁴ que la France ouvrit les yeux sur

¹ La clique de l'intendant Bigot qui a fait un Panama sur le Saint-Laurent.

² Il veut dire: Faible population; ressources du pays très peu développées; mauvaise administration; le tout présentant un état précaire; la colonie incapable de tenter seule la résistance nécessaire pour se sauver.

³ Le devoir envers la famille et le soin de la vie ordinaire.

⁴ Régime de M. de Beauharnois, gouverneur général, arrivé au mois d'août 1726, retourné en France le 14 octobre 1747; et Gilles Hocquart, intendant de 1729 à 1748. La Galissonnière succéda à Beauharnois. Bigot à Hocquart. Bigot resta intendant l'espace de douze ans sous divers gouverneurs.

l'opulence naturelle de ces belles possessions et les avantages qu'elle en pouvait retirer. Dès ce moment on y découvrit des sources de richesses, qu'auparavant on n'avait pas même soupçonnées :¹ des mines de fer et de cuivre, des bois de construction, des goudrons, des gommes précieuses, partout des terres fertiles qui n'attendaient que des bras, et dont les premiers essais donnaient déjà beaucoup au delà des besoins ; des communications faciles, des rivières navigables, des torrents rapides où mille forces mouvantes² pouvaient sans frais plier toute la nature à nos besoins. Le commerce de France s'y porta avec plus de force et allait toujours croissant, d'année en année, en proportion de sa plus grande consommation. La population était déjà montée à plus de quatre-vingt mille âmes³ et chaque jour y apportait des augmentations sensibles. Encore vingt ans, et cette fertile et immense colonie eut pour jamais assuré à la France le plus grand, le plus riche commerce du monde. Quel genre d'amélioration et d'augmentation aurait-on pu désirer dont elle n'eut pas été susceptible ? Les produits du territoire, les usines, les chasses, les pêches, tout cela n'était encore qu'au berceau ; quand on formait un établissement on en voyait autour de soi cent autres à exploiter, plus inépuisables et plus riches encore ; il semble que la nature avait amoncelé dans ces heureux climats mille trésors qu'elle n'attendait que le moment de répandre.

“ Des possessions si grandes, si belles ; d'une richesse si solide, si durable, si peu limitée, ont-elles été connues ? et si le préjugé avait voulu les connaître, aurait-il fatigué le gouvernement de ses cris pour les faire céder à l'ennemi ? Que l'Anglais, toujours occupé de ses vues d'agrandissement, en demeure possesseur tranquille, dès ce moment sa grandeur et sa puissance n'ont plus de bornes, nul Etat au monde ne l'égalera du côté des forces et de l'immensité des ressources ; il vaincra qui il voudra vaincre ; l'Amérique entière sera sa première conquête, les forces de l'Angleterre n'y seront pas nécessaires, les coups seront portés sur nos îles avant que l'Europe en ait eu connaissance. L'Espagne elle-même vient de voir de bien près la foudre qui doit un jour dévaster ses opulents domaines du Nouveau-Monde.

“ On l'a déjà dit, toutes les rivières, tous les lacs, toutes les baies, tous les golfes du Canada, abondent en poissons de toutes les espèces ; le plus avide pêcheur peut donner carrière à ses vastes désirs, il remplira ses vaisseaux des siècles entiers de toutes les pêches qu'il voudra choisir, et

¹ Depuis plus d'un siècle on les connaissait en Canada, seulement on ne s'en doutait pas dans le royaume, par la faute des marchands de fourrures qui avaient étouffé la colonie dès sa naissance.

² Cette observation est remarquable pour le temps.

³ Ce chiffre est exagéré puisque, en 1765, il n'y avait pas tout à fait soixante-dix mille âmes.

la nature les lui reproduira avec la même prodigalité. Morues, sardines, harengs, marsouins, loups marins, vaches marines, baleines, cachalots, etc., tout se présente au dard ou à l'hameçon et en si grande quantité que le pêcheur succombe sous des travaux si vifs et si rapides... Si l'Anglais nous interdit les pêches, s'il nous refuse un asile pour les exploiter ou, ce qui revient au même, s'il en offre un entièrement inutile, ce n'est pas précisément pour nous forcer d'acheter de lui ces mêmes denrées que nous procurerions nos travaux; c'est pour anéantir dans la source toute notre navigation, et porter en même temps la sienne à un point d'élévation qui puisse lui faire braver toutes les forces navales de l'Europe séparées ou réunies. C'est le golfe Saint-Laurent, c'est dans les mers qui l'avoisinent que se forment ses matelots et les nôtres; toutes les autres navigations les détruisent; celle-ci en est la première et les conserve; après cette perte irréparable, nul espoir ne reste à la France de rétablir sa marine, et les deux mers qui la baignent et qui jadis virent les triomphes, inutiles désormais, à son commerce et à sa vengeance, ne serviront qu'à nous montrer de plus près l'énorme puissance que notre pusillanimité aura formée de ses propres mains.

«Voilà donc, entre les mains des Anglais, deux fondements indestructibles et à jamais inépuisables de la plus puissante marine: le Canada et les pêches de ses golfes... Notre commerce avec le Canada et l'île Royale ne faisait que commencer et déjà, dans les quatre années qui ont précédé la guerre, nous y envoyions, des divers ports de France, cinquante-cinq à soixante navires (on ne parle pas des bâtiments destinés pour la pêche, qui vont de trois à quatre cents) chaque année et apportait à ce commerce des accroissements sensibles...¹ Le fond de notre commerce avec le Canada et l'île Royale avait cela d'avantageux qu'il n'était composé que de denrées et marchandises du cru et des fabriques du royaume: des vins, des eaux-de-vie, des sels,² des étoffes de laine, des toiles, des cotonnades, des soiries, des chapeaux, etc.³ La plupart de ces effets consommaient nos laines de France, et une multitude innombrable d'ouvriers des deux sexes vivaient de ce commerce... Les retours du Canada sont connus. Les pelleteries de toute espèce... des pêches... des huiles de poisson qui déjà avaient porté la mégisserie du royaume au plus haut point de splendeur; le ginseng, cette plante précieuse, que

¹ Durant les onze dernières années du régime français, la Rochelle avait expédié au Canada des navires au nombre de cent cinquante-un: 1749, 10; 1750, 14; 1751, 16; 1752, 16; 1753, 17; 1754, 15; 1755, 16; 1756, 17; 1757, 15; 1758, 9; 1759, 1.

² Trois produits particuliers à la Rochelle.

³ Aussi le vermillon, les rassades, les fers de flèche pour les Sauvages, les couteaux dits bucheron, flatin, croche, siamois, à jambette, à manche de bois, tant pour les Français que pour les Sauvages.

le Chinois achète au poids de l'or; le tabac qui y croît partout et dont la qualité égale celle des meilleurs du monde, et tout cela n'était encore que de faibles commencements, des essais, des ébauches dans les exploitations de tout genre; encore était-on arrêté et contredit partout par une administration avide, envahissante, qui ramenait tout à elle et qui, du poids de son autorité, étouffait tous les germes d'émulation et de zèle..."

VI.

Le mal était fait; la situation irrémédiable; tout ce qui resta à la France furent les îles Saint-Pierre et Miquelon, avec la pêche sur une partie des côtes de Terre-Neuve. De ces concessions, il résulta que la marine française put conserver un champ de manœuvre où ses matelots se sont formés depuis cent quarante ans. Qui sait si les remontrances de la Rochelle et des autres villes n'ont pas, dans le temps du traité de 1763, contribué pour beaucoup à inspirer le ministère français dans sa persistance à se faire accorder au moins ces réserves? C'est assez probable. Nous avons vu depuis, chaque fois que la question du *French shore* de Terre-Neuve s'est soulevée, que la France tenait à son privilège en raison de l'utilité que sa marine en retirait et, l'an dernier encore, lorsque l'affaire fut réglée moyennant compensation, cet argument se présenta le premier en évidence. Quant à Saint-Pierre et Miquelon, dès 1762, Roubaud, qui travaillait du côté anglais, sonnait l'alarme en disant que si ces deux îles restaient françaises elles deviendraient des nids de contrebandiers, en quoi il ne se trompait pas. L'annexion de Terre-Neuve au Canada est possible maintenant par suite de l'absence du privilège, mais les îles restent étrangères au drapeau britannique.

Les lettres et mémoires cités plus haut font remonter à l'origine de la colonie l'état de chose qui devait aboutir à l'abandon de la Nouvelle-France, ce qui est d'accord avec l'histoire, car en 1759 il ne restait plus une seule faute à commettre pour amener la séparation. Le voisinage des Anglais avait constamment doublé les embarras d'une situation déjà critique par elle-même, et l'on n'avait pas su imiter leur exemple en fortifiant notre population sous le rapport du nombre et des libertés qui facilitent le commerce et les industries. Le régime était faux, ses conséquences devaient être désastreuses.

Le roi, souverain maître du sol, des hommes et des animaux, partout où flottait son pavillon, se trouvait être le marchand général du Canada et il conduisait les affaires par l'entremise de quelques agents favorisés, tous gens qui avaient leur fortune à faire. Ce monopole allait à l'encontre du développement de la colonie; il était tout à l'avantage des ramasseurs de peaux de castor, mais en France, lorsque l'on parlait du Canada c'était à cause de ces derniers et non pas en pensant à la

colonie réelle. La culture des champs n'attirait nullement l'attention ; aucune industrie ne pouvait naître parce que cela offusquait les manufacturiers de France. Le Canada n'était qu'un enfant à peine sorti du berceau et se traînant en langeur, sans parvenir à pouvoir marcher. Les commerçants de fourrures l'amusaient en le détournant de sa carrière naturelle. Après de longues années, il sembla acquérir un peu de vigueur et se dressa debout ; alors on lui mit un mousquet entre les mains pour aller combattre les Anglais qui gênaient le trafic des gens du roi. Cette belle éducation lui valut après des guerres épuisantes, de devenir possession britannique et alors il se trouva libéré du régime débilitant de son enfance.

Du côté des Anglais, nos voisins, les choses se passaient autrement. Le roi d'Angleterre laissait ses sujets s'arranger à leur guise, de sorte que une partie des colons s'adonnaient à la culture du sol, d'autres aux industries, ou à la navigation, le commerce et, parmi ces derniers, un certain nombre s'occupaient de tirer des pelleteries en s'approchant des tribus sauvages, parfois assez éloignées d'eux, mais sans y mettre autant d'ardeur que les Français. Non seulement ces colons exploitaient les ressources de leur pays, mais ils se gouvernaient eux-mêmes, tandis que chez nous la moindre affaire dépendait de la dictée de Versailles. Se rend-on compte, maintenant, de la nature des choses dans des conditions si différentes ? Ici la faiblesse ; là-bas la force. On a dit que la question des frontières alluma le feu de la guerre, oui, pour complaire au commerce de fourrures qui n'avait jamais assez de territoire à parcourir. Les traiteurs, de part et d'autre, finissaient par se rencontrer. William Pitt comprit ce que l'Angleterre gagnerait à s'emparer du Canada.

IV.—*Les successeurs de La Vérendrye—sous la domination Française.*

1. *Joseph Fleurimont de Noyelles*; 2. *Jacques Repentigny Le Gardeur, Sieur de Saint-Pierre*; 3. *Saint-Luc de La Corne*.

1743-1755.

Par le juge L. A. PRUD'HOMME.

(Lu 22 mai 1906.)

Notes Préliminaires.

C'est le triste privilège des hommes de bien, qui ont accompli de grandes choses par leur mérite personnel et leur courage persévérant, d'être en butte aux mauvaises passions et de soulever autour d'eux une meute d'envieux, jaloux de leur gloire. Les âmes mesquines et étroites, corrodées par le venin de la colère et du dépit, fruits secs et impuissants, s'acharnent avec ardeur à rabaisser la réputation de ceux qui les offusquent, espérant se grandir sur les ruines des hommes illustres qu'elles désirent supplanter. Sentant leur incapacité à s'élever jusqu'à la hauteur de ces géants, elles s'efforcent par mille ruses de réduire leur taille à leur propre mesure. Ce spectacle navrant de l'histoire de notre pauvre humanité déchuë, offre quelque chose de pénible à constater et est bien propre à faire monter l'indignation aux cœurs justes, nobles et droits.

C'est ainsi, par exemple, que Christophe Colomb, qui découvrit l'Amérique, reçut des chaînes pour récompense. On lui déroba l'honneur, qui lui revenait en toute justice, de donner son nom au continent qu'il venait de révéler au monde. La Vérendrye ne fut guère mieux traité. A force de sacrifices et de constance dans les plus cruelles épreuves, après avoir versé le sang des siens, et épuisé toutes ses ressources personnelles, il réussit à se frayer un chemin depuis les rivages du lac Supérieur, jusqu'aux premiers pics des Montagnes Rocheuses. Il reconnut tout cet immense océan de prairies, les principales rivières qui l'arrosent et les nombreuses tribus sauvages qui habitaient cette région jusqu'alors inconnue des blancs. Il sillonna de forts ou de postes, la route des canots jusqu'à la fourche des deux branches de la Saskatchewan, et amena avec lui des généreux missionnaires qui commencèrent à évangéliser les aborigènes. Bref, il conquit à sa patrie, un territoire au moins quatre fois plus vaste que la France. Pour le récompenser de services si distingués, on le laissa gémir dans l'indigence, et on chercha à couvrir son nom d'opprobre, en prêtant à ses plus nobles

actions, des motifs d'intérêt sordide et d'ambition personnelle. Pauvre et méconnu, il mourut à la peine, laissant sa famille dans une extrême gêne. Ses enfants qui avaient partagé ses travaux se virent chassés du Nord-Ouest et pendant plus d'un siècle leur nom demeura enseveli dans l'oubli. Mais l'histoire est fatale à l'ambition et à l'injustice et elle est venue enfin venger la mémoire des La Vérendrye.

La Vérendrye eut trois successeurs: MM. de Noyelles, Le Gardeur de Saint-Pierre et Saint Luc de la Corne. Saint-Pierre eut pour lieutenant M. de Niverville, qui alla plus loin que son chef. M. de Noyelles était un homme de cœur, qui comprenait l'injustice commise envers le Découvreur. Il laissa aux fils le soin de continuer l'œuvre du père. Ils remontèrent la Saskatchewan jusqu'à la fourche, où ils établirent un fort. Saint-Pierre, Niverville, Saint-Luc de la Corne viendront dans la suite, et marcheront sur leurs brisées, sans s'aventurer au-delà, si l'on en excepte l'expédition sans chef qui éleva le fort La Jonquière. C'est ce que nous allons constater en offrant une réparation tardive, à ces nobles fils de la Nouvelle-France.

L'an dernier j'ai eu l'honneur de présenter devant la Société Royale, une étude sur la vie de La Vérendrye. Je me propose aujourd'hui de poursuivre ce travail, et de consacrer quelques lignes aux successeurs de ce grand homme. Elles compléteront le tableau des principaux événements qui se sont accomplis dans cette partie du Canada, sous la Domination Française.¹

Le Capitaine Charles Joseph Fleurimont de Noyelles et les fils de La Vérendrye.

1743-1750.

Le capitaine de Noyelles, qui succéda à La Vérendrye, était un homme de mérite, exercé aux grandes courses et habitué à la vie des pays d'en haut. En 1720, il avait eu le commandement du poste important de Détroit, où il avait été remplacé par A. de Tonty. On le retrouve en charge du même poste en 1728 et de 1738 à 1741. Il fut promu au grade de capitaine en 1732. En 1735 on l'envoya faire une campagne contre les Renards, à la tête d'un corps de cadets. La même année que La Vérendrye démissionna (1743) le capitaine de Noyelles

¹ C'est dans la collection des pièces publiées par M. Pierre Margry que la plupart de mes renseignements sont puisés, mais comme tout est pêle-mêle dans cette collection, j'ai cru bien faire en groupant ici les passages qui concernent le Nord-Ouest, vu qu'il est impossible de les comprendre sans leur donner de l'ordre et de la suite. J'y ajoute le classement des forts qui peut servir de base à l'étude des expéditions sous le régime français.

fut chargé de poursuivre les découvertes de l'ouest. Il était autorisé à prendre possession des postes établis par le Découvreur, sans compensation pour ce dernier.

L'état des esprits au Nord-Ouest exigeait à cette époque une main sure et expérimentée. Les Sioux d'un côté et les Serpents de l'autre brûlaient du désir d'écraser leurs ennemis.

Les sauvages ne s'aventuraient plus dans la prairie, qu'entourés de toutes les précautions possibles et par bandes. Le fort La Reine, qui se trouvait peu éloigné de la zone habitée par les Sioux, souffrait de ce règne de terreur, qui était répandu partout. La traite était devenue plus difficile et moins abondante. Bon nombre de Cris reprirent la route de la baie d'Hudson. M. de Noyelles, qui n'avait ni les connaissances, ni la supériorité de La Vérendrye, ne s'épargna pas cependant pour parer à cette situation. Il admirait son prédécesseur et semble avoir regretté sincèrement qu'il eut été ainsi dépouillé du fruit de ses conquêtes. Ces sentiments lui font honneur. Ne pouvant convenablement lui offrir de s'associer à ses travaux, il appela ses fils à son aide en 1747. L'un d'eux, le chevalier Pierre Gaultier, se rendit au fort La Reine. On y constate sa présence en 1745; et la même année, il retourna à Montréal.

Au printemps 1747, le chevalier La Vérendrye était en route pour Montréal avec une bande de Christinaux et quelques autres sauvages amis, lorsqu'il rencontra sur son chemin un parti de guerre qui s'en allait faire une incursion sur le territoire de la Nouvelle-Angleterre. Il ne pouvait manquer une si bonne aubaine. Il s'avança jusqu'aux environs d'Albany où il défit une troupe de Hollandais et d'Iroquois. Il se dirigea ensuite vers Montréal où il se trouvait le 29 mars 1747. J'ignore jusqu'où le chevalier La Vérendrye s'était rendu en 1746. Il peut se faire qu'il avait recruté ces Christinaux au fond du lac Supérieur ou même aux lacs La Pluie ou des Bois.

De 1744 à 1747, M. de Noyelles prit des mesures pour parvenir à pacifier les sauvages. A cette fin, il visita le fort Kaministigoya et de ce poste il fit parvenir des messages aux Sioux et aux Cris, les suppliant d'enterrer la hache de guerre. Il chercha les moyens de convoquer des députés de ces deux nations, dans une conférence de paix. Ses efforts n'aboutirent à rien. Le 20 juin 1747, il résolut de ne plus attendre et de marcher de l'avant. Il commença par s'assurer des services du chevalier La Vérendrye, et partit de Montréal avec lui, pour se rendre au fort La Reine. Parvenus à Michillimakinac, ils trouvèrent les Outaouais et les Sautaux en proie à une grande agitation. Certaines paroles menaçantes, échappées à des chefs influents, faisaient redouter un soulèvement.

Ils résolurent de rebrousser chemin pour en informer le gouverneur. Ils craignaient que le convoi de marchandises expédiées de Montréal à ce poste, ne tombât entre les mains de ces sauvages. Deux des fils de La Vérendrye acceptèrent d'accompagner les canots, pour les protéger contre toute attaque et le 14 octobre 1747, ils arrivaient heureusement à Michillimakinac. Ils constatèrent que la bonne entente, un moment troublée, avait été rétablie. M. de Noyelles n'alla donc pas personnellement prendre possession des forts de La Vérendrye, en 1747, et jusqu'à cette date des commis en charge y faisaient la traite, d'après ses instructions.

Au mois de janvier 1748, on constate que l'un des fils du Découvreur se mit à la tête d'un parti composé de Canadiens et d'Outaouais et alla guerroyer contre les Anglais et les Iroquois.

M. de Noyelles, en juin 1748, voulut reprendre le voyage interrompu de l'année précédente. Il partit de nouveau de Montréal, avec le chevalier La Vérendrye et atteignit cette fois le fort La Reine. Ils trouvèrent le fort Maurepas réduit en cendres par les sauvages. Le chevalier le rétablit ainsi que le fort La Reine qui tombait en ruine. M. de Noyelles se hâta ensuite d'envoyer le chevalier ainsi que son frère François fonder des postes dans la direction des lacs Manitoba et Winnipeg, aux endroits qu'ils jugeraient convenable.

Fort Dauphin rétabli en 1748 et Fort Bourbon fondé la même année par les fils de La Vérendrye.

Les fils de La Vérendrye se rendirent tout d'abord à la pointe nord-ouest du lac Dauphin où ils relevèrent le fort du même nom, précédemment érigé au même endroit, à l'automne 1741. De là, se dirigeant toujours vers le nord et passant probablement par le lac du Cygne, ils arrivèrent à la rivière La Biche où ils construisirent un fort. Le premier fort Bourbon, se trouvait donc sur la rivière La Biche (Red Deer) qui se jette dans le lac Winnipegosis. C'est à l'embouchure même de cette petite rivière que fut érigé ce fort. Plus tard, ils durent fonder le second fort Bourbon, à l'endroit où la Saskatchewan s'élargit pour former le lac Bourbon (Cedar). On a retrouvé les restes de ce dernier fort. Le premier fort Bourbon ne devait être qu'un poste d'occasion et il n'en est resté aucun vestige.

Le lac Bourbon n'est séparé du lac Winnipegosis que par une langue de terre d'environ deux milles de largeur. Le terrain sur cette lisière est fort bas et marécageux. En été, on ne peut franchir cette étroite bande qu'à un endroit où s'élève comme un dos de chameau un sentier couvert de cailloux. Le reste du terrain ne constitue, à proprement parler, qu'une mousse tremblante à travers laquelle un voyageur, chargé

d'un fardeau un peu lourd, risquerait beaucoup de s'enfoncer. Un bon nombre d'anciens du pays ont cru, qu'au temps de La Vérendrye, les lacs Bourbon et Winnipegosis ne formaient qu'un seul et même bassin d'eau, sans division.

Remontant ensuite la rivière Saskatchewan, appelée Poskoyac par les sauvages, le chevalier La Vérendrye explora cette rivière jusqu'à la fourche formée par la réunion des branches nord et sud. A tous les printemps, les Christineaux des montagnes, des prairies et des rivières, à l'ouest et au nord de ces deux embranchements, se réunissaient à la fourche pour tenir conseil et décider s'ils allaient se rendre avec leur fourrure aux postes français ou à la Baie chez les Anglais.

Fort Poskoyac fondé par le chevalier La Vérendrye en 1748.

La fourche était tout indiquée d'avance, pour les raisons qui viennent d'être données, pour l'établissement d'un fort. C'est là que plus tard devait s'élever le fort La Corne. En attendant, le chevalier, qui avait déjà construit deux forts durant l'année, dût se contenter d'y ériger un poste peu important. La saison était trop avancée pour en faire davantage. Il lui donna le nom de Poskoyac, qui était celui de la rivière qui coulait à ses pieds. Il dut l'abandonner pendant l'hiver, remonta les eaux de la Saskatchewan. Il apprit des sauvages que cette rivière prenait sa source dans les Montagnes Rocheuses, qu'il avait visitées en 1743.

M. de Noyelles remplacé par Le Gardeur de Saint-Pierre. Dernières années des fils de La Vérendrye.

En 1750, M. de Noyelles, qui était allé rendre compte de son administration au gouverneur, fut remplacé par Le Gardeur de Saint-Pierre. Les fils de La Vérendrye présentèrent à l'intendant Bigot, une requête dans laquelle ils exposaient leurs droits à continuer l'œuvre de leur père. Cet homme néfaste refusa de les entendre. Sous son régime, la justice ne se rendait pas; elle se vendait. Or, les fils de La Vérendrye étaient pauvres et honnêtes. Dans ces conditions, ils ne pouvaient pas s'attendre à recevoir quoique ce fut de Bigot. Ils offrirent alors à M. de Saint-Pierre de servir sous ses ordres, comme ils venaient de le faire sous M. de Noyelles. Saint-Pierre, peut-être jaloux de leur mérite ou du moins incapable d'apprécier un tel acte de magnanimité, les repoussa. On refusa même de leur rendre les livres de compte et les marchandises qu'ils avaient en propre dans les forts. Voyant l'inutilité de leurs efforts, les trois fils de La Vérendrye reprirent la carrière des armes. L'un d'eux, qui était enseigne, fut tué au siège de Québec. Le chevalier

devint lieutenant et périt au mois d'octobre 1761 dans le naufrage de l'*Auguste*; ce navire ramenait en France nombre d'officiers français, parmi lesquels plusieurs s'étaient avancés à l'ouest du lac Supérieur, tels que La Durantaye, Boucher de Laperrière et Saint-Luc de la Corne.

NOTE.—Il ne resta en Canada qu'un seul fils de La Vérendrye, qui a probablement fait souche. C'est le plus jeune nommé Louis Joseph. Il épousa en premières noces le 7 novembre 1755 Marie Amable Testard DeMontigny fille de Jacques DeMontigny. De ce mariage naquit une fille baptisée à la Longue Pointe. Sa première femme mourut en 1756. Le 31 janvier 1758 il épousait Louise Antoine Mezière de Lapervenche âgée de 26 ans. Ce dernier acte de mariage est consigné dans les registres de Laprairie, P. Q. Il paraîtrait que Louis Joseph Gauthier de La Vérendrye alla demeurer à Montréal où il vécut jusqu'en 1797.—Il était officier. A-t-il laissé des descendants mâles qui auraient pris tout simplement le nom de "Gauthier"?—

Le capitaine Jacques Repentigny Le Gardeur, sieur de Saint-Pierre, chevalier de l'ordre militaire de Saint-Louis, 1750-1753.

Ce vaillant officier, second sieur de Saint-Pierre, était le plus jeune fils de Jean-Paul Le Gardeur et de Josette Leneuf de la Vallière. Il naquit en 1701, dans la seigneurie de Repentigny. Il était donc canadien, comme La Vérendrye. Dès l'âge de 15 ans, il commença à servir son pays chez les sauvages. En 1732, il était enseigne dans l'armée coloniale et en 1735 il fut nommé commandant du fort Beauharnois, chez les Sioux. Il abandonna ce poste en 1737 et fut envoyé à la tête d'une expédition contre les Chickasaws. On le retrouve ensuite un peu partout, où il y avait un coup de feu à faire. En 1745, il conduisit un parti d'éclaireurs au fort Saint-Frédéric. De là, il prit la route de l'Acadie. En 1747, on lui confia le commandement du poste le plus considérable sur les grands lacs, le fort de Michillimakinac. Enfin, en 1750, il avait été promu au grade de capitaine, pour ses brillants états de service, et il reçut instruction de continuer les explorations de La Vérendrye, au Nord-Ouest.

Cette fois, le gouvernement se chargeait de toutes les dépenses de cette expédition. On se proposait avant tout, d'amasser des fourrures. Les découvertes devaient venir au second plan. On devait traverser le continent à deux endroits à la fois. Pendant que Saint-Pierre parviendrait aux rives du Pacifique par la vallée de la Saskatchewan, le capitaine la Malgue de Marin devait atteindre le même but, en remontant le Missouri. Marin avait instruction de ne rien négliger pour pacifier les Sioux, tandis que Saint-Pierre s'emploierait à obtenir le même résultat chez les Cris. Ils s'étaient donnés rendez-vous à une certaine

latitude convenue, par delà les Montagnes Rocheuses. Cette expédition toutefois était subordonnée aux intérêts de la traite, qui devait primer tout. C'était le renversement de la politique de La Vérendrye.

Le capitaine de la Malgue de Marin.

Cet officier ne manquait pas de mérite, mais comme Saint-Pierre, il était âpre au gain.

Saint-Pierre et Marin avaient associé à leur entreprise commune le gouverneur de la Jonquière, le fameux intendant Bigot, et le contrôleur de la marine, M. de Bréard. Le premier but de cette expédition était une riche moisson de fourrure. Saint-Pierre et de Marin remportèrent un plein succès sous ce rapport. Quant au projet de traverser le continent, il tomba à l'eau. Le capitaine Marin fut ensuite nommé commandant du district de la rivière Ohio (Belle-Rivière) et de ses dépendances. Il mourut au fort LeBœuf à l'automne 1753. Son fils, qui était lieutenant, le remplaça chez les Sioux. Au mois d'août 1758, il était à la tête d'un parti de 250 hommes composés de canadiens et de sauvages. Il défit au fort Lidius le général Robert Rogers qui commandait un corps de 750 Anglais, après lui avoir tué un grand nombre d'hommes.

Saint-Pierre et de Niverville au fort La Reine en 1750.

Saint-Pierre, qui avait le gouverneur et l'intendant pour associés, réalisa de gros profits, comme on le lui demandait, mais il se contenta de suivre les sentiers battus. Il partit de Montréal le 5 juin 1750. Après avoir fait 38 portages, sur la rivière Pigeon, dont le premier avait quatre lieues de longueur, et le moindre un quart de lieue, il se rendit au fort Saint-Pierre, où il eut une longue entrevue avec les sauvages.

Il fit un stage aux forts Saint-Charles et Maurepas et ne cessa d'exhorter les Cris à mettre fin à la guerre. Ses conseils ne produirent aucun effet et pendant l'hiver, Cris et Sioux continuèrent à se scalper et à couvrir les lacs et les prairies de sang et de désolation. Saint-Pierre était accompagné d'un jeune officier, parent de La Vérendrye, le chevalier Boucher de Niverville, enseigne des troupes du Canada. Les Français des divers postes se trouvaient dans une grande disette de vivres, par suite du départ des sauvages pour une campagne contre les Sioux. Dans ces circonstances, afin d'avoir moins de bouches à nourrir, il fit partir Niverville pour la rivière Poskoyac. Niverville et ses compagnons faillirent mourir de faim dans ce voyage. Ils cachèrent une partie de leurs provisions dans le bois, pour leur retour et amenèrent le reste sur des traînes sauvages. Malgré le soulagement que lui apportait

le départ de la brigade qui suivait Niverville, Saint-Pierre se trouvait dans une grande gêne, à un tel point qu'il dût détacher une autre bande de ses hommes, pour les envoyer chasser, dans les bois avoisinants le fort La Reine. Saint-Pierre avoue que le jeune rigide qu'il fut obligé d'observer, finit par ébranler sa santé et le mit hors d'état de ne rien entreprendre. Il profita toutefois de la présence de quelques prisonniers de guerre que les Cris et les Assiniboines lui amenèrent au fort La Reine pour obtenir une suspension des hostilités. Cédant à ses prières, ces sauvages lui remirent les prisonniers et il les renvoya sains et saufs à leur tribu, avec des paroles de paix. Cet expédient eut le succès voulu et fit cesser momentanément la guerre.

Expédition du chevalier Boucher de Niverville. Fort La Jonquière fondé en 1751. Départ de Saint-Pierre pour ce dernier poste. Il rebrousse chemin. Appréciation des sauvages par Saint-Pierre.

Saint-Pierre avait donné ordre à Niverville d'aller établir un fort à 300 lieues plus haut que celui de Poskoyac. Cette expédition ne devait quitter le fort La Reine qu'au printemps 1751, mais la famine força Saint-Pierre de devancer le temps. Niverville quitta le fort La Reine tard dans l'automne 1750.

Les glaces le forcèrent bientôt d'abandonner ses canots et de continuer le voyage à pied. Le 29 mai 1751, il fit partir du fort Poskoyac deux canots, montés par dix hommes, qui devaient se rendre aux Montagnes Rocheuses. Il devait lui-même, un mois après, se mettre à leur suite. Une maladie fort grave, dont il faillit mourir et qui le réduisit à une telle extrémité, qu'il ne pouvait plus écrire, le força de rester à ce poste. Ces dix Français remontèrent la Saskatchewan, jusqu'à l'endroit occupé aujourd'hui par Calgary. Ils y construisirent un fort considérable, dans lequel ils amassèrent une grande quantité de provisions, en attendant l'arrivée de Niverville, leur chef. En 1875 le capitaine E. Brisebois, de la police à cheval, fut chargé de bâtir un fort au pied des Montagnes Rocheuses. Il l'érigea sur les bords de la rivière des Arcs, à l'endroit même qu'occupait jadis le fort La Jonquière, dont il retrouva les ruines et lui donna le nom de "Fort Brisebois," auquel a succédé depuis celui de Calgary.

Au printemps 1751, Niverville envoya quelques engagés au fort La Reine pour informer Saint-Pierre de ce qu'il avait fait et de la maladie qui menaçait de le terrasser. Saint-Pierre partit au cours de l'été (1751) pour se rendre au Grand-Portage, avec les fourrures reçues vages qui comptaient de 40 à 50 cabanes, autour du nouveau fort, la se disposait à se rendre au fort La Jonquière. Il quitta le fort La

Reine le 14 novembre. Quelques jours après son départ et avant d'avoir pu arriver jusqu'à Niverville, il rencontra deux Français et quatre sauvages, qui lui apprirent que Niverville ne se portait pas mieux. Ils lui dirent également que les Assiniboines avaient tué un parti de sauvages qui comptaient de 40 à 50 cabanes, autour du nouveau fort, La Jonquière. Or, ces sauvages qui s'appelaient "Yatché-Jillini" devaient être les guides de Saint-Pierre. Les Assiniboines, toujours fourbes, avaient commencé par festoyer avec eux, pendant cinq jours, leur prodiguant tous les témoignages de la plus grande amitié. Le sixième jour se trouvant plus nombreux qu'eux, ils se jetèrent tout à coup sur leurs ennemis sans défense et les égorgèrent presque tous, sans pitié, moins quelques femmes et enfants qu'ils amenèrent prisonniers. On ne saurait dire au juste jusqu'où Saint-Pierre se rendit, mais il n'est pas probable qu'il atteignit la Saskatchewan. Cette nouvelle dérangeait tous ses plans et il décida sur le champ de retourner sur ses pas. Il était de retour au fort La Reine avant le 14 février 1752.

Saint-Pierre s'était formé une bien triste opinion des tribus sauvages du Nord-Ouest. Aussi il ne les ménage pas dans ses appréciations: "Voilà 36 ans, dit-il, que je suis parmi les sauvages, mais je n'en ai jamais vu qui égalent en perfidie ceux en question." Il rencontra des aborigènes qui lui montrèrent des chevaux et des selles qu'ils avaient reçus en échange, des Serpents. Ces derniers, sans doute, se les étaient procurés des Espagnols. Si, à cette époque, les chemins de fer ne sillonnaient pas nos prairies sans fin, les moyens de communication ne manquaient pas absolument aux sauvages. En peu de temps, les articles obtenus des blancs, sur le littoral du Pacifique ou au golfe du Mexique, passaient de tribu en tribu, jusque dans l'intérieur du continent. Saint-Pierre rapporte que, d'après le témoignage des sauvages, les Anglais de la Baie d'Hudson encourageaient les Cris qui visitaient leurs forts, à faire la guerre contre les nations qui n'allaient pas traiter à la baie. "Ces sauvages, ajoute-t-il, au nombre de 50,000 hommes, en état de porter les armes, aiment d'inclination les Français, mais craignent les Anglais. Les Anglais fâchés de n'avoir pas en quantité des pelleteries à la baie d'Hudson, envoient des colliers à ces sauvages, pour leur défendre, sous peine de périr, d'en porter ailleurs que chez eux, ce à quoi n'ayant point obéi et étant morts 800 personnes d'un rhume, ils furent tous saisis de peur, et se dirent que le Manitou les avait affligés, à la prière des Anglais."

Attaque du fort La Reine par les Assiniboines, le 22 février 1752.

Saint-Pierre était bien éloigné de posséder l'esprit conciliant de La Vérendrye. Dans ses mémoires, on constate par les épithètes qu'il

décoche à l'adresse des sauvages, qu'il ne les aimait guère. Ils ne tardèrent pas à se rendre compte de ces sentiments à leur égard. L'incident qui va suivre indique que les choses étaient bien changées depuis le départ de La Vérendrye. Ce dernier était invité par toutes les tribus de venir se fixer chez elles. Les sauvages pleuraient quand ils le renvoyaient après quelques mois d'absence. On se disputait la joie de le posséder et à la mort de son fils, tous les Cris étaient debout frémissant de rage, sollicitant en vain du Découvreur l'ordre d'aller le venger et adoptant son second fils comme chef. Cette bonne amitié ne cessa un instant de régner, pendant tout le temps que La Vérendrye ou ses fils explorèrent l'ouest. Deux ans après leur départ, les indigènes brûlaient les forts qu'ils avaient aidés à élever et se liguèrent pour chasser les Français du pays. Ces faits éloquents se passent de commentaires.

Je laisse la parole à Saint-Pierre lui-même, qui va nous raconter comment il faillit un jour être massacré, avec tous les Français du fort La Reine: "Le 22 février 1752, vers 9 heures a.m., je me trouvais dans ce fort avec 5 Français. J'avais envoyé le surplus de mes gens, consistant en 14 personnes, chercher des vivres dont je manquais depuis plusieurs jours. J'étais tranquille dans ma chambre, lorsqu'il entra dans mon fort 200 Assiniboëls tous armés. Ces sauvages se dispersèrent en un instant dans toutes les maisons. Plusieurs entrèrent chez moi sans être armés, les autres restèrent dans le fort. Mes gens vinrent m'avertir de la contenance de ces sauvages. Je courus à eux; je leur dis vertement qu'ils étaient bien hardis de venir en foule armés, chez moi. L'un d'eux me répondit en Christinaux qu'ils venaient pour fumer. Je leur dis que ce n'était pas de la façon dont ils devaient s'y prendre et qu'ils eussent à se retirer sur le champ. Je crus que la fermeté avec laquelle je leur avais parlé, les avait un peu intimidés, surtout ayant mis à la porte quatre de ces sauvages les plus résolus, sans qu'ils eussent dit un mot. Je fus tout de suite chez moi, mais dans le moment un soldat vint m'avertir que le corps de garde était plein de ces sauvages et qu'ils s'étaient rendus maîtres des armes. Je me hâtai de me rendre au corps de garde. Je fis demander à ces sauvages par un Christinaux, qui me servait d'interprète, quelles étaient leurs vues, et pendant ce temps-là, je me disposais au combat avec ma faible troupe. Mon interprète, qui me trahissait, me dit que ces sauvages n'avaient aucun mauvais dessein et dans la minute un orateur Assiniboël, qui n'avait cessé de me faire de belles harangues, dit à mon interprète que, malgré lui, sa nation voulait me tuer et me piller. A peine eus-je pénétré dans leur résolution, que j'oubliai qu'il fallait prendre les armes. Je me saisis d'un tison de feu ardent. J'enfonçai la porte de la poudrière; je défonçai un baril de poudre, sur lequel je promenai mon tison, en

faisant dire à ces sauvages d'un ton assuré, que je ne périrais point par leurs mains et qu'en mourant j'aurais la gloire de leur faire à tous subir mon même sort. Ces sauvages virent plutôt mon tison et mon baril de poudre défoncé, qu'ils n'entendirent mon interprète; ils volèrent tous à la porte du fort, qu'ils ébranlèrent considérablement, tant ils sortaient avec précipitation. J'abandonnai bien vite mon tison et n'eus rien de plus pressé que d'aller fermer la porte de mon fort. Le péril dont je m'étais heureusement délivré en me mettant en danger de périr moi-même, me laissait une grande inquiétude pour les 14 hommes que j'avais envoyé chercher des vivres. Je fis bon quart sur mes bastions. Je ne vis plus d'ennemis et sur le soir, mes 14 hommes arrivèrent sans avoir eu aucune rencontre."

Saint-Pierre abandonne le fort La Reine au printemps 1752. Les Christianaux brûlent ce fort. Il hiverne au fort Rouge, 1752-1753. Délégués Cris et Sioux à Michillimakinac pour traiter de la paix. Saint-Luc de la Corne le remplace, 1753. Caractère de Saint-Pierre. Ses exploits glorieux. Sa mort le 8 septembre 1755.

Saint-Pierre passa tranquillement le reste de l'hiver dans son fort, sans autre incident important. Au printemps, craignant de laisser des Français au fort, pendant son voyage annuel au Grand-Portage, pour transporter les fourrures et ramener des marchandises, il prit tout son monde avec lui. Quatre jours après son départ du fort La Reine, les Assiniboines y mirent le feu, et ce fort si considérable, le quartier général des Français de l'ouest, fut réduit en cendre. Saint-Pierre n'apprit cet événement que le 29 septembre 1752, alors qu'il revenait du Grand-Portage et se trouvait au bas de la rivière Winnipeg. Il décida d'hiverner à la Rivière-Rouge, sans doute au fort Rouge, construit par M. D'Amour de Louvière, au mois d'octobre 1738. Au lieu de se porter de l'avant, il se voyait dans la nécessité de reculer.

Au printemps de 1753, Niverville, qui avait fini par se rétablir, quittait la Saskatchewan, après un séjour de deux ans et demi à la fourche de cette rivière. Les hommes qu'il avait envoyés fonder le fort La Jonquière, informés de la maladie de Niverville avaient abandonné ce poste et étaient retournés au fort Poskoyac où Niverville les attendait. Ils trouvèrent en passant, les ruines du fort La Reine et rencontrèrent en route Saint-Pierre et ses engagés, avec lesquels ils se rendirent au Grand-Portage. On eut dit que les Français se retiraient de l'ouest. Cette retraite était une mauvaise note pour Saint-Pierre. Même au point de vue commercial, sa mission n'avait pas eu tous les résultats qu'on en attendait. Il avoue lui-même que les Anglais de la baie d'Hudson lui enlevaient plus de fourrures que tous les postes de la colonie n'en pouvaient rentrer. Après leur retour au Grand-Portage,

en juillet 1753, ni Saint-Pierre, ni Niverville ne retourna au Nord-Ouest. Saint-Pierre fut remplacé par Saint-Luc de la Corne, cousin germain de La Vérendrye.

J'ai déjà dit un mot du dessein de Saint-Pierre d'amener les sauvages à faire la paix. Le lieutenant de Marin, qui avait succédé à son père en 1752, devait travailler, de concert avec lui, à faire cesser les hostilités entre les Sioux et les Cris; il obtint des Sioux des lacs et des bois la promesse d'envoyer des députés à Michillimakinac pour cimenter cette union désirée. Les Cris, à la demande de Saint-Pierre, en firent autant. Le 29 février 1753, Marin écrivit à Saint-Pierre, du pays des Sioux où il commandait, l'informant que les Sioux des lacs et des bois étaient prêts à se séparer complètement des Sioux des prairies et même à se liguier contre eux avec les Christinaux, s'ils ne voulaient pas consentir à signer un traité de paix. Marin avertissait Saint-Pierre, qu'à cet effet, il amènerait avec lui plusieurs chefs Sioux à Michillimakinac, durant l'été suivant, et l'invitait à ne pas manquer d'arriver avec les délégués Christinaux, au lieu du rendez-vous.

Au mois d'août 1753, Saint-Pierre se rendit, en effet, à l'endroit convenu. Il arriva malheureusement trop tard. Marin, après l'avoir attendu quelque temps, avec plusieurs Sioux, ne pouvant rester à Michillimakinac plus longtemps, était retourné à la baie des Puants. Saint-Pierre, pressé de se rendre à Montréal, laissa à Saint-Luc de la Corne le soin de mener cette entreprise à bonne fin. Saint-Pierre arriva à Montréal en septembre 1753.

On l'envoya immédiatement au secours de la Malgue de Marin, sur la rivière Ohio. Sommé de quitter le pays par le major Washington, comme commandant en chef des troupes Françaises, il répondit par une lettre remplie de sentiments de dignité et de noble fierté, qui montraient son esprit chevaleresque. Cet homme était assurément un officier admirable de courage et de ressources, à la guerre. Par contre, il manquait de souplesse et des ménagements qu'exigeait la prise de possession des territoires du Nord-Ouest, où fomentaient depuis des siècles, des haines héréditaires entre les diverses tribus. Prompt à l'action, trop pressé d'agir quand il aurait fallu obtempérer et s'ingénier à trouver des moyens de conciliation, il ne se trouvait pas, au milieu de nos prairies, dans le milieu qui lui convenait. Son tempérament fougueux ne s'accommodait guère d'une mission si délicate. Avec les meilleures intentions de bien servir son pays, il ne réussit qu'à rendre plus difficiles les rapports des Français avec les sauvages. Il est vraiment regrettable d'avoir à constater ici, que cet officier refusa obstinément de prendre à son service les fils de La Vérendrye, malgré les sollicitations pressantes de ces derniers. Cette action ne lui fait pas honneur et montre une

étroitesse de sentiment qu'on ne s'attendait pas à rencontrer chez un militaire si brillant.

Il fut remplacé, à la rivière Ohio, par M. de Contrecoeur peu de temps avant la capture de Washington et de son armée au fort Nécessité. L'année suivante, il fut placé à la tête des sauvages alliés, dans l'expédition du baron Dieskau, et fut tué dans le premier engagement, à la bataille du lac Saint-Sacrement (George) le 8 septembre 1755. Après cette bataille, les Nipissings et les Algonquins continuèrent à lever des chevelures aux Anglais et aux Iroquois, pour venger la mort de leur vaillant commandant.

Le P. Jean-Baptiste de La Morinie, S.J., 1726-1764. Au fort La Reine de l'été 1750 à juin 1751. Il repasse en France en 1764.

En écrivant les notes qui précèdent sur M. de Saint-Pierre, j'ai, à dessein, écarté le nom du P. La Morinie, qui l'avait accompagné, afin de ne pas interrompre le récit des événements historiques qui se déroulaient alors dans le Nord-Ouest, me réservant de consacrer ensuite quelques lignes à cet excellent missionnaire.

Le P. de La Morinie naquit le 24 décembre 1704. Il entra dans la compagnie de Jésus le 6 octobre 1725. Il était de la province d'Aquitaine et arriva à Québec en 1726. Quatre ans plus tard, on le trouve à la mission de la rivière St-Joseph, sur la rive sud-est du lac Michigan. Il fit publiquement la profession de ses quatre vœux dans l'église de la mission de St-Ignace, à Michillimakinac, le 2 février 1741, entre les mains du P. du Jaunay, et après avoir passé l'hiver à cet endroit, il retourna à St-Joseph. Lorsque Saint-Pierre fut chargé de continuer les découvertes de La Vérendrye, le P. de La Morinie fut désigné pour l'accompagner au fort La Reine, pendant l'été 1750. Comme il arrivait à ce poste, les sauvages avaient déterré la hache de guerre. Les Français, abandonnés des indigènes, gémissaient, faute de vivres, dans leurs forts déserts. Les Assiniboines qui habitaient le voisinage du fort La Reine se montraient mal disposés envers Saint-Pierre, qui les traitait avec arrogance. Dans ces circonstances, on ne saurait s'étonner que ce missionnaire ne pût exercer son ministère avec succès. Réduits à un jeûne démoralisant, les Français avaient besoin des consolations de ce religieux pendant le triste hiver de 1750-1751, pour ne pas tomber dans le découragement. Se mourant presque de faim, menacés à chaque instant d'être scalpés par les sauvages, dont la guerre attisait les cruautés natives, on comprend quelle heureuse influence ce missionnaire pouvait exercer parmi eux, afin de les soutenir dans leurs épreuves.

Nous savons que le P. La Morinie enseigna à prier aux Assiniboines et aux Cris; qu'il leur apprit les principaux mystères du christianisme

et qu'il alla catéchiser sur la rivière Souris et le lac Dauphin. Ces rudes voyages en plein hiver, sont une preuve de son dévouement apostolique, pour répandre la foi. Plus de cinquante ans après son départ, les sauvages instruits par lui, se rappelaient ses enseignements et continuaient à réciter les prières qu'il leur avait apprises. Sa santé toutefois ne put résister à de si grandes privations. Affaibli par la misère, il tomba malade. Le 22 juin 1751, il quitta le fort La Reine et retourna à Michillimakinac, d'où il était parti au mois de juillet ou août précédent. Il continua ensuite à desservir la mission de St-Joseph jusqu'en 1761, époque à laquelle il passa à la mission des Illinois. En 1762, il se trouvait à Ste-Geneviève, qui faisait partie de la mission de la Louisiane. Il avait pour compagnon le P. de Salleneuve, S.J. Ils demeurèrent ensemble à cet endroit jusqu'en 1763. Le 23 septembre de cette année-là, l'arrêt d'expulsion des PP. Jésuites de la Louisiane, leur fut communiqué. Ils se dirigèrent immédiatement en canot vers la Nouvelle-Orléans et au printemps 1764, le P. de La Morinie repassa en France.

Le capitaine Saint-Luc de la Corne, chevalier, succède à Saint-Pierre. Le fort "La Corne," appelé Nipawi par les sauvages, remplace le fort Poskoyac. Premiers essais de culture à Pasquia, sur la rivière Carotte en 1754.

1753-1755.

En 1753, M. Saint-Luc de la Corne fut nommé successeur à Le Gardeur de Saint-Pierre. Il était parent de La Vérendrye. Son administration dura peu de temps. La guerre de Sept Ans venait d'éclater entre la France et l'Angleterre et le Nord-Ouest fut abandonné.

Avant de pénétrer dans l'ouest, M. de la Corne recueillit de Saint-Pierre les renseignements qu'il possédait sur le pays et décida de se rendre immédiatement à la rivière Saskatchewan et d'échelonner des forts jusqu'aux Montagnes Rocheuses. En 1753, il atteignit le fort Poskoyac, construit par le chevalier La Vérendrye et dans lequel M. de Niverville avait hiverné. M. de la Corne aurait désiré d'abord de séjourner au fort La Reine, mais comme il avait été détruit, il résolut de passer outre et de donner plus d'importance au fort Poskoyac. Il y fit de nombreuses améliorations et y érigea des constructions nouvelles. Ce fort ainsi restauré et devenu le plus considérable de cette époque, reçut le nom de "Fort la Corne." Les sauvages le désignaient sous le nom de Nipawi, qui signifie "Debout." Il se trouvait à quelques mille de l'est de la jonction des branches sud et nord de la Saskatchewan. M. de la Corne, explora également la vallée de la rivière Carotte. Quelques

Français, sous ses ordres, ayant trouvé un endroit favorable à la culture, ensemencèrent quelques arpents. Ces premiers travaux agricoles au Nord-Ouest, eurent lieu durant l'été 1754. L'établissement portait le nom de Pasquia. Sir Alexander Mackenzie y retrouva, plus tard, les restes d'instruments d'agriculture, en traversant cette région.

Il est probable aussi que ce fut sous M. de la Corne, qu'un fort fut construit sur la Saskatchewan, à peu de distance du lac Cumberland. Lorsque Joseph Frobisher, en 1772, établit le fort Cumberland, il trouva les vestiges de ce fort.

Après que M. de la Corne eut substitué son propre nom à celui de Poskoyac, au fort près de la fourche, le fort construit près du lac Cumberland hérita du non de Poskoyac. Certains écrivains ont prétendu que le fort Poskoyac, que bâtit le chevalier La Vérendrye, se trouvait tout près du site occupé aujourd'hui par Cumberland House, que ce fut à cet endroit que M. de Niverville tomba malade, et qu'enfin le premier fort construit près de la fourche, fut le fort La Corne. Cette opinion me semble erronée, car il n'est pas probable que La Vérendrye et Niverville aient pu négliger un point stratégique comme celui de la Fourche. La Fourche, en effet, était le lieu des pourparlers et des rendez-vous des sauvages et s'indiquait tout naturellement comme l'endroit le plus désirable pour un fort. M. de la Corne n'eut point le loisir de pousser de l'avant et de se rendre au fort La Jonquière. La Nouvelle-France, abandonnée à ses seules ressources, contre des armées sans cesse grossissantes, allait tenter un dernier effort pour conserver la colonie à sa mère-patrie.

Ne recevant plus de secours de France, les gouverneurs firent appel aux tribus amies, pour défendre le pays contre les légions que la Nouvelle-Angleterre allait lancer contre cette poignée de braves. Les découvertes furent abandonnées et des profondeurs de l'ouest accoururent les officiers français en retraite, à la tête de leurs bandes guerrières, pour livrer les derniers combats et couvrir la défaite d'un dernier rayon de gloire. M. de la Corne, qui était officier, rentra donc dans les rangs de la brillante armée que commandait Montcalm. Il est probable qu'il quitta l'ouest en 1755. Au mois d'août 1758, il était à la tête d'un corps composé de 400 canadiens et 200 sauvages et rencontra entre le fort Lidius et le fort Georges, un convoi de 50 chariots de vivres et de marchandises avec 200 bœufs. Ce convoi était escorté par un parti de 200 Anglais. M. de la Corne les attaqua, leur tua 110 hommes, fit 60 prisonniers, détruisit les chariots, s'empara des marchandises et tua les bœufs. Il ne perdit dans cette escarmouche qu'un sauvage qui fut tué et deux blessés. On constate qu'au mois de juillet 1759, une bande de 130 sauvages des pays d'en haut, composée de Cris, Sauteux et Folle-

Avoine, vint combattre sous Montcalm, à Québec. Il est fort probable que les Cris des lacs des Bois et La Pluie, entraînés par M. de la Corne, étaient compris dans ce groupe et que l'ouest fut représenté à cette heure solennelle, qui décida du sort de la Nouvelle-France.

M. de la Corne était à bord de l'*Auguste*, qui, au mois d'octobre 1761, alla se briser sur les côtes du Cap-Breton. Dans cette même catastrophe périrent M. de la Corne et le chevalier de La Vérendrye, qui l'avait précédé sur les bords de la Saskatchewan. C'est ainsi que le fils du premier blanc qui visita nos prairies et celui qui ferme la liste de ses successeurs, furent ensevelis dans un même tombeau. Je donne ci-après comme appendice à l'histoire de La Vérendrye et de ses successeurs, un tableau des établissements français au lac Népigon et à l'ouest du lac Supérieur, avec quelques notes indiquant la date et l'endroit de leur fondation. En jetant un coup d'œil sur ce tableau, le lecteur pourra suivre, en quelque sorte, la marche des découvreurs français, dans cette région.

Forts et postes fondés par les Français au Nord-Ouest.

1. Fort Caministigoyan, fondé par Greysolon Du Lhut de la Tourette, à l'entrée du lac Népigon, durant l'été 1678.
2. Fort La Tourette, fondé par le même, à l'embouchure de la rivière Ombabiha (lac Népigon), en 1684.
3. Fort des Français, fondé par le même aux fourches de la rivière Kénogami et Albany, en 1685.
4. Fort Camanitigoya, fondé par Zacharie Robutel de la Noue, à l'embouchure de la rivière Kaministiquia, en 1717.
5. Poste du Grand Portage, fondé par le même, à l'entrée de la rivière Pigeon, entre 1718 et 1720.
6. Fort Saint-Pierre, fondé par Christophe Dufrost de la Jemmeraye, à l'entrée de la rivière La Pluie, à l'automne 1731.
7. Fort Saint-Charles, fondé durant l'été 1732 par Pierre Gaultier Varennes de La Vérendrye, le Découvreur du Nord-Ouest, à l'entrée de la petite rivière de l'Angle, sur la rive nord, à quelques arpents de l'île Buckété (Famine). Cette rivière tombe près des ruines de ce fort, dans le lac des Bois et conduit à l'angle nord-ouest, où venait déboucher à travers la forêt, l'ancien chemin Dawson. C'est dans ce fort que se trouvent les restes entiers du P. Aulneau et du fils aîné de La Vérendrye et les têtes seulement de leurs 19 compagnons.
8. Fort Maurepas, fondé par le fils aîné de La Vérendrye, à l'embouchure de la rivière Winnipeg, un peu plus bas que le fort Alexandre et sur le côté nord de cette rivière, à l'automne 1734.
9. Fort de la Fourche aux Roseaux, fondé par le Découvreur à 6 milles plus bas que la ville de Selkirk, probablement sur la rive ouest,

durant l'été 1733. C'est à ce petit poste d'occasion que mourut et fut enterré La Jemmeraye.

10. Fort Rouge, fondé par M. D'Amour de Louvière, à l'embouchure de la rivière Assiniboine, sur la rive sud, au mois d'octobre 1738.

11. Fort La Reine, fondé au mois d'octobre 1738 par le Découvreur, au Portage la Prairie, sur la rive nord de l'Assiniboine, près d'une coulée, dont les eaux au printemps se rendent en forme de rivière, jusqu'au lac Manitoba. L'ancien fort de la Baie d'Hudson avait été construit sur le site même du fort La Reine.

12. Fort Dauphin, fondé par le chevalier de La Vérendrye, sur la pointe nord-ouest du lac Dauphin, à l'automne 1741.

13. Fort Bourbon, le premier, fondé par le même, à l'embouchure de la rivière La Biche (Red Deer), sur le lac Winnipegosis, en 1748.

14. Fort Bourbon, le second, fondé à l'endroit où la rivière Saskatchewan s'élargit pour former le lac Bourbon (Cedar), entre les années 1748 et 1755. Il est probable qu'il fut construit par les fils de La Vérendrye, en 1748.

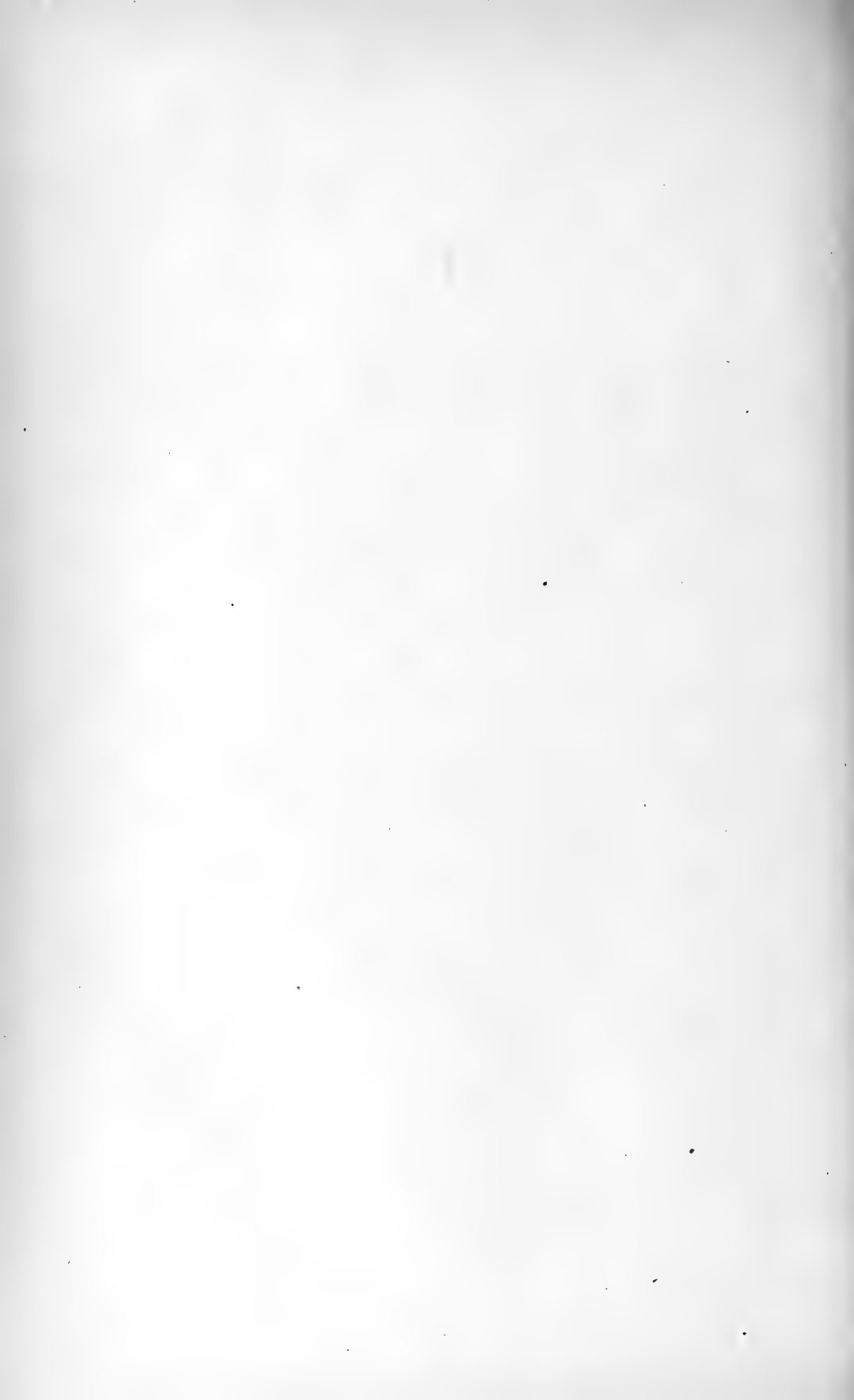
15. Fort Poskoyac, fondé par le chevalier de La Vérendrye, près de la fourche de la Saskatchewan, en 1748.

16. Fort La Corne, appelé Nipawi par les sauvages, fondé par le chevalier Saint-Luc de la Corne, à quelques milles à l'est de la jonction des branches sud et nord de la Saskatchewan, en 1753.

17. Fort La Jonquière, fondé en 1751 par quelques Français envoyés par M. de Niverville, qui était retenu par la maladie au fort Poskoyac. Ce fort se trouvait à l'endroit qu'occupait la caserne de la police à cheval, sur la rivière des Arcs, à Calgary.

18. Fort Poskoyac, le second, appelé aussi fort Français, fondé à l'entrée du lac Cumberland par M. de la Corne, entre 1753 et 1755.

19. Poste Pasquia, établi sur la rivière Carotte par M. de la Corne, à l'été 1754



V.—*Etude sur “ Les Anciens Canadiens.”*

Par l'abbé CAMILLE ROY,

Licencié ès-lettres, docteur en philosophie, professeur à l'Université Laval.

(Lue le 22 mai 1906.)

Il s'agit du livre de Philippe-Aubert de Gaspé, de l'œuvre la plus populaire peut-être qu'il y ait dans notre littérature canadienne. Nulle part nos anciens n'ont été mieux racontés, décrits, photographiés et resuscités: et s'il n'est pas nécessaire que la critique rappelle ce livre à l'attention et à la sympathie du public, peut-être n'est-il pas inopportun qu'elle essaie d'en préciser la valeur, et de définir, à l'aide des documents qu'il nous fournit, l'esprit qui l'a conçu. Ni le livre qui s'imprime toujours, ni l'auteur que l'on appelle encore très poliment Monsieur de Gaspé, ne veulent mourir, et c'est donc un sujet d'étude qui offre quelque intérêt que de rechercher et d'expliquer le pourquoi de cette si active survivance.

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On se souvient du sujet traité, et du thème sur lequel broda le romancier.

Jules d'Haberville et Archibald Cameron of Lochiel—Arché, comme on l'appelle familièrement—sont des amis de collège que la camaraderie a rendus frères. Arché est un orphelin des montagnes de l'Ecosse: fils d'une mère française qu'il perdit dès l'âge de quatre ans, et d'un chef de clan qui périt dans cette désastreuse bataille de Culloden où s'abîma pour jamais l'indépendance de l'Ecosse, il fut recueilli par un oncle maternel, un jésuite, qui l'envoya à Québec, au Collège des Pères de la Compagnie. Jules estime Arché pour ses malheurs, il l'aime pour son âme franche et loyale. Quand arrivent, chaque année, les grandes vacances, il l'amène avec lui au manoir paternel de Saint-Jean-Port-Joli, où l'enfant est accueilli comme l'enfant du foyer.

Àu printemps de 1757, Jules, qui a du sang de soldat dans les veines, s'en va commencer en France sa carrière militaire. Arché retourne en Angleterre, où il prend du service. Mais la guerre est déclarée entre les deux grandes nations, et elle ramène au Canada, sous des drapeaux ennemis, les deux frères. Arché, qui ne peut trahir son roi, exécute les ordres les plus cruels, et il est en proie aux déchirements de sa conscience. C'est lui qui incendie le manoir des d'Haberville. Il devient odieux à ses anciens bienfaiteurs.

Jules, qui sait les devoirs austères de la vie militaire, se réconcilie le premier avec Arché. Mais ce ne fut que plusieurs années après la cession, que le malheureux lieutenant de Montgomery put rentrer en grâce au manoir reconstruit des d'Haberville.

Pour sceller d'un serment solennel et sacré ce nouveau pacte d'alliance, Arché demande à Blanche sa main. Tous deux sont épris l'un de l'autre, mais Blanche sacrifie encore une fois sa passion à sa dignité, et elle refuse d'épouser celui qui fut l'incendiaire de sa maison.

Jules prend pour femme une jeune Anglaise qu'il a connue sur le vaisseau qui le ramena au Canada. Il continue, au manoir des d'Haberville, entre ses parents devenus vieux, l'oncle Raoul et Blanche, les traditions hospitalières de sa famille. Et plus tard, quand bien des années eurent passé sur les amours de Blanche et d'Arché, et les eurent transformés en une pure amitié fraternelle, Arché vint lui aussi reprendre sa place au foyer des bienfaiteurs de sa jeunesse.

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Tel est le plan, ou le dessin très simple, peu compliqué de la trame du livre de M. de Gaspé. Et c'est à propos d'un pareil livre qu'on a pu se demander s'il était vraiment un roman, s'il n'était pas plutôt une série de tableaux historiques, ou bien encore s'il ne constituait pas pour nous, Canadiens, une première ébauche, l'esquisse d'une épopée nationale. Pourquoi *les Anciens Canadiens* ne seraient-ils pas tout cela, et tout à la fois? Le roman ne peut-il pas être une véritable épopée, et l'épopée n'est-elle pas à son tour de l'histoire?

Aussi bien, d'ailleurs, y a-t-il dans l'œuvre de Gaspé tous les éléments, sauf les vers, tous les ingrédients qui entrent dans la confection d'une épopée. C'est une chanson de geste en prose qu'a écrite l'auteur des *Anciens Canadiens*; et il y a enfermé et mêlé l'histoire et la légende; il y a raconté des actions héroïques et les drames non moins poignants de la conscience; il y a introduit le merveilleux sans lequel il paraît que ne peuvent subsister les œuvres épiques; il y a fait apparaître un amour trop discret peut-être pour que le roman s'en puisse contenter, mais qui ne laisse pas de rappeler ces sourires mêlés de larmes qui traversent l'*Illiade*, ou cette passion vive et contenue, qui n'éclate que pour mourir à la fin de *la Chanson de Roland*. Et si vous ajoutez à tout cela la couleur solide et fraîche des paysages, le style tout émaillé et garni des expressions de nos bonnes gens, très simple, familier, sans apprêt, que l'auteur a jeté comme une draperie canadienne sur les pages de son livre, ne trouverez-vous pas qu'il y a là vraiment tout ce qu'il faut pour faire de M. de Gaspé, non pas, sans doute, l'Homère des Canadiens, ni leur Tuoldus, mais peut-être bien le conteur naïf et le plus charmant

des choses de leur passé, l'évocat le plus puissant des mœurs et d'une civilisation à peu près déjà disparus, et pour cela même le chantre vraiment épique d'une phase merveilleuse de leur histoire?

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Nous le tenons de M. de Gaspé lui-même, c'est d'abord pour faire de l'histoire qu'il écrivit son livre, et se fit auteur à l'âge de 75 ans. Et c'est le mouvement littéraire de 1860 qui orienta de cette façon l'esprit du vieillard. Les *Soirées Canadiennes*, que fondèrent en 1861, Joseph Charles Taché, le docteur Hubert Larue et l'abbé Casgrain, avaient pour épigraphe cette parole de Charles Nodier: "Hâtons-nous de raconter les délicieuses histoires du peuple avant qu'il les ait oubliées." L'année précédente l'abbé Casgrain avait lui-même publié les *Légendes*, qui furent son entrée très bruyante et très applaudie dans les lettres canadiennes. M. de Gaspé les lut sans doute avec avidité, ces légendes qui avaient couru les campagnes de la Rivière-Ouelle, et elles firent s'éveiller au fond de son esprit tout un monde de vieux et chers souvenirs. Mais il entendit surtout comme un appel fait à lui-même le mot de Charles Nodier que répétaient chaque mois à leurs lecteurs les *Soirées Canadiennes*, et il entreprit donc de raconter à son tour, avant de descendre dans la tombe, les histoires et les légendes qui avaient enchanté sa vie et sa mémoire.

Il était né en 1786, vingt-six ans seulement après les guerres de la conquête; il avait donc recueilli sur les lèvres mêmes des derniers défenseurs de la Nouvelle-France le récit de leurs actions. Par son père et par sa mère, il se trouvait être presque le contemporain, et il fut lui-même le témoin de ces mœurs anciennes qui caractérisaient la vie de nos pères, avant 1760, et pendant les dernières années du dix-huitième siècle. C'était donc à lui de parler avec toute l'autorité de ses soixante-quinze ans; c'était à lui de "raconter les délicieuses histoires du peuple canadien avant qu'il les oubliât." Les autres, les jeunes, ne pouvaient guère recevoir que de la bouche des vieillards ce secret du passé. Et puis, encore, n'y aurait-il pas un intérêt puissant à voir cet homme qu'entraînait déjà dans son flot le courant irrésistible des habitudes nouvelles, essayer de se reprendre aux vieilles traditions et de montrer et découvrir à l'œil des contemporains qui étaient ses fils, les mœurs et la vie d'une autre époque et d'un autre siècle?

Au surplus, les anciens souvenirs de M. de Gaspé étaient situés dans un recul assez lointain pour qu'ils fussent déjà tout pénétrés de poésie, et enveloppés de merveilleuses légendes. Et ce serait donc tout ensemble

de la réalité et de la fantaisie, de la vérité et de la fiction, qui alterneraient dans ces pages offertes aux petits enfants des soldats de 1760, et qui les feraient bien vite ressembler, ces pages ingénues, à ces naïfs récits d'Hérodote qui enchantaient l'imagination des fils des vainqueurs de Salamine. C'est donc dans le véritable mirage où se bercent les souvenirs des vieillards, c'est presque déjà dans une lumière d'épopée que M. de Gaspé, tout comme l'auteur des *Histoires*, pouvait placer et laisser repaser les personnages, les événements qui remplissent son livre, toutes les choses qui furent la grandeur et la force des *anciens Canadiens*.

Dans ce lointain fantastique, M. de Gaspé aperçoit la petite et la grande histoire; et s'il s'inquiète de nous révéler l'une et l'autre, il est bien visible qu'il incline plus volontiers vers la petite, ou, si l'on aime mieux, vers celle qui se fait chaque jour et se compose des habitudes et des mœurs, et des vertus et des actions obscures d'un chacun. Au lieu que dans l'épopée classique, ce sont les rois et les princes, les chefs d'armées ou les preux chevaliers qui remplissent tout le poème de la majesté de leurs noms, du bruit de leurs querelles et du cliquetis de leurs armes, ici c'est l'homme du peuple, c'est l'habitant canadien, et le seigneur de village ou le jeune lieutenant qui agitent à chaque page leur modeste mais vive et originale silhouette. C'est l'épopée des humbles que veut écrire l'auteur des *Anciens Canadiens*, je ne sais quel souffle démocratique et populaire passe et circule à travers les pages de cette œuvre. M. de Gaspé nous invite lui-même à bien voir dans son livre une image réelle et authentique de la société de nos gens d'autrefois. Il affirme que tout ce qu'il rapporte des mœurs anciennes est véridique, et il commente par des notes abondantes et toutes personnelles qu'il ajoute à son roman, tels détails ou telles assertions qui pourraient paraître fantaisistes. Et ce n'est pas l'un des moindres plaisirs du lecteur que celui de se sentir tout d'abord en pleine vie réelle, et de pouvoir se reposer toujours avec sérénité sur la bonne foi et la véracité de l'auteur.

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C'est, au premier plan, le tableau de la vie du seigneur et de l'habitant canadien que dessine et peint M. de Gaspé. Or, la vie seigneuriale qu'il reconstitue n'est pas autre que celle que l'on faisait au manoir de son père à Saint-Jean-Port-Joli. Le manoir des d'Haberville, c'est, en effet, celui des de Gaspé, et c'est donc dans la maison même où fut élevé et où a grandi l'auteur, c'est au foyer où on l'initia aux vertus patriarcales de sa famille qu'il nous introduit. Autour du manoir, M. de Gaspé groupe les braves censitaires; et c'est la cordialité des relations mutuelles, l'affabilité du seigneur, le respect et le dévouement des bonnes

gens, c'est par-dessus tout l'esprit chrétien qui anime, vivifie, élève toutes ces humbles existences, que M. de Gaspé se plaît à préciser et à célébrer.

Il faudrait ici pouvoir assister aux réunions de famille dans le salon du manoir, aux excursions dans les champs ou sur les grèves de Saint-Jean-Port-Joli; il faudrait relire le chapitre qui est consacré à la fête du mai que l'on a planté dans le parc de M. d'Haberville, et signaler les joyeuses agapes où seigneurs et censitaires, groupés autour des mêmes tables, fraternisent dans la plus franche gaieté, et font chanter sur leurs lèvres les populaires refrains de la Nouvelle-France. Il serait aussi plaisant d'entendre raconter les bonnes histoires qui sont les délicieux et variés entremets de ces repas familiers, et par exemple celles que raconte le capitaine Marcheterre, pendant le souper que l'on prend à Saint-Thomas, chez le seigneur, M. de Beaumont, et toutes ces escapades dont fut coutumière et bien chargée l'enfance aimable et très active de monsieur Jules.

L'abondance copieuse et grasse, la gaieté vive et enjouée, la politesse toute cordiale et simple, voilà ce qui faisait le charme des festins du bon vieux temps, et de ces pantagruéliques repas, que Jules décrit à Arché,¹ et que se donnaient les uns aux autres, pendant les longs mois d'hiver, les habitants de nos campagnes.

M. de Gaspé regrette que tout cela soit déjà en train de disparaître dans le faux éclat du luxe qui nous envahit, et c'est après avoir raconté les fêtes de famille auxquelles donna lieu le retour de Jules au foyer paternel, et fait assister le lecteur aux jeux et divertissements bruyants mais honnêtes qui suivaient le repas, qu'il écrit avec un accent de patriotique tristesse:

"Heureux temps où l'accueil gracieux des maîtres suppléait au luxe des meubles de ménage, aux ornements dispendieux des tables, chez les Canadiens ruinés par la conquête! Les maisons semblaient s'élargir pour les devoirs de l'hospitalité; comme le cœur de ceux qui les habitaient!"²

En dehors de la table, et des réunions joyeuses de l'amitié, l'habitant canadien est appliqué à son devoir, et sous le costume rustique et pittoresque que décrit plus d'une fois M. de Gaspé, il remplit avec courage et avec entrain sa tâche quotidienne; il fait modestement et très consciencieusement cette petite histoire, qui est bien l'histoire vraie et toute belle de son pays.

Cette petite histoire s'agrandit, d'ailleurs, d'elle-même; et selon les mouvements généreux et héroïques des âmes populaires, elle s'élève par-

¹ Page 131 de la première édition, 1863. Nous renverrons toujours le lecteur à cette édition.

² Page 330.

fois jusqu'à la hauteur des grands drames, et de la plus héroïque épopée. Souvenez-vous de cette scène inoubliable et si angoissante de la débâcle, à Saint-Thomas de Montmagny. C'est au moment où Jules et Arché, qui retournent du collège au manoir, arrivent au village de Saint-Thomas. La cloche de l'église sonne à toute volée, et appelle au bord de la rivière, du côté de la chute, toute la population inquiète et affolée. Là, un homme, qui avait voulu traverser la rivière en voiture, le malheureux Dumais, est aux prises avec la glace qui se brise, qui s'effondre. Déjà de hardis sauveteurs se risquent au secours du naufragé. Le péril est d'autant plus grave, que la débâcle de la rivière peut s'effectuer d'un moment à l'autre, et pousser avec une force irrésistible vers la cataracte et vers la mer sauveteurs et victime. Et, en effet, pendant que l'on cherche à opérer le sauvetage, "un mugissement souterrain, comme le bruit sourd qui précède une forte secousse de tremblement de terre, semble parcourir toute l'étendue de la Rivière-du-Sud, depuis son embouchure jusqu'à la cataracte d'où elle se précipite dans le fleuve Saint-Laurent. A ce mugissement souterrain succéda aussitôt une explosion semblable à un coup de tonnerre dans le lointain... Ce fut une clameur immense. La débâcle! la débâcle! Sauvez-vous! sauvez-vous! s'écrièrent les spectateurs sur le rivage.

"En effet, les glaces éclataient de toutes parts, sous la pression de l'eau qui, se précipitant par torrents, envahissait déjà les deux rives. Il s'en suivit un désordre affreux, un bouleversement de glaces qui s'amoncelaient les unes sur les autres avec un fracas épouvantable, et qui, après s'être élevées à une grande hauteur, surnageaient ou disparaissaient sous les flots. Les planches, les madriers sautaient, dansaient, comme s'ils eussent été les jouets de l'océan soulevé par la tempête. Les amarres et les câbles menaçaient de se rompre à chaque instant."¹

Ce fut pendant ces scènes indescriptibles de confusion, où la plus vive anxiété, l'espérance et l'angoisse secouaient tour à tour les spectateurs, que Jules et Arché arrivèrent au rivage; et l'on sait comment Arché, n'écoutant que son vaillant cœur, s'élança, les reins ceinturés d'une forte amarre, dans la rivière, et comment, se laissant emporter par les flots déchaînés, il s'en alla recueillir, au vieux tronc de cèdre où il s'était cramponné, mais que les glaces menaçaient à chaque instant d'arracher, l'infortuné Dumais.

Ce sauvetage héroïque constitue l'un des chapitres les mieux écrits, et les plus fortement conçus de toute l'œuvre de Gaspé. Le mouvement des foules, des glaces et des eaux y est décrit avec une telle ampleur et variété, qu'une vie intense déborde de ces pages, et que nulle part ailleurs, dans ce livre, on ne voit l'histoire des humbles s'élargir avec

¹ Page 65.

plus de puissance, et devenir plus naturellement de la véritable et très vaillante épopée.

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De Gaspé, qui a su raconter et peindre si vivement un tel épisode, pouvait ensuite entreprendre de tracer d'une main sûre les scènes sanglantes et désastreuses de la guerre. Ces scènes sont, en vérité, de la plus grande histoire, mais la grande histoire est aussi familière à notre auteur que la petite; et s'il éprouve quelque tristesse à raconter nos dernières résistances patriotiques, il y a dans les regrets du vieillard je ne sais quelle joie discrète et forte qui se manifeste et éclate, quand il rappelle tant d'actions valeureuses, tant de sacrifices si courageusement offerts, tant d'immolations sublimes, qui couronnent comme d'une auréole de martyr la suprême agonie de la puissance française en Amérique.

Et il met à raconter cette gloire des défenseurs du drapeau blanc, un empressement d'autant plus grand que trop longtemps ici on a ignoré la conduite de ces soldats malheureux, et que trop volontiers l'on a prêté l'oreille aux calomnies des historiens anglais.

"Vous avez été longtemps méconnus, mes anciens frères du Canada! Vous avez été indignement calomniés. Honneur à ceux qui ont réhabilité votre mémoire! Honneur, cent fois honneur à notre compatriote, M. Garneau, qui a déchiré le voile qui couvrait vos exploits! Honte à nous qui, au lieu de fouiller les anciennes chroniques si glorieuses pour notre race, nous contentions de baisser la tête sous le reproche humiliant de peuple conquis qu'on nous jetait à la face à tout propos! Honte à nous qui étions presque humiliés d'être Canadiens! Confus d'ignorer l'histoire des Assyriens, des Mèdes et des Perses, celle de notre pays était jadis lettre close pour nous."¹

C'est pour contribuer lui-même à cette œuvre de réhabilitation qu'il raconte quelques-unes des dernières scènes du drame qui se dénoue aux portes de Québec, sur les plaines d'Abraham.

Et d'abord, l'incendie de nos campagnes, dont avec une habileté d'artiste et de romancier, il fait coupable Arché lui-même. Quand on lit ces pages où flamboie "l'incendie de la côte sud," on ne sait si la désolation des habitants, et les ruines fumantes de tant de maisons réduites en cendre sont un spectacle plus triste et plus lamentable que le drame tout psychologique qui occupe et torture la conscience du lieutenant de Montgomery. Ce fut vraiment le triomphe de l'écrivain de faire, malgré tout, si sympathique aux lecteurs canadiens le destructeur même de leurs propres foyers.

¹ Page 201.

Puis, comme pour opposer à ce tableau où s'étalent d'inutiles et sombres vengeance, qu'éclairaient les plus sinistres reflets, la hardiesse loyale et franche de nos soldats, la lumière pure des grands dévouements, M. de Gaspé nous fait assister aux dernières escarmouches qui terminèrent notre consolante et dernière victoire de 1760. Il met en présence les deux jeunes guerriers qui doivent retenir l'attention du lecteur. Il procède un peu à la façon d'Homère, qui ne s'attachait nullement à décrire les mouvements d'ensemble des batailles où Troyens et Grecs luttaient corps à corps, et se précipitaient les uns contre les autres, mais aimait mieux décrire ces combats singuliers où deux guerriers, Agamemnon et Oïlée, Achille et Hector, mesurent leur valeur. L'auteur des *Anciens Canadiens* n'entreprend pas le récit de cette grande mêlée héroïque où les Canadiens, conduits par Lévis, et victorieux pendant la journée du 28 avril, prouvèrent une fois encore qu'ils étaient plus grands que leurs malheurs. Il concentre plutôt l'attention du lecteur sur les deux héros de son drame, et s'il met en bonne lumière, autour du moulin de Dumont, la prudence réfléchie d'Arché, il exalte avec une visible prédilection le courage bouillant et irrésistible de Jules. Le *petit grenadier*, comme on l'appelle au camp, se jette tête baissée au milieu des ennemis plus nombreux, et à travers les balles anglaises il s'élance trois fois à l'assaut du moulin qu'on se dispute comme une indispensable forteresse; après le combat et la victoire finale, c'est au milieu d'un monceau de morts et de blessés qu'il faudra aller chercher le jeune et brave d'Haberville.

Ce seul fait d'arme, raconté d'une plume alerte et précise, résume dans sa vaillante et brève simplicité toute la bravoure du soldat canadien-français. Et il est exposé là, sous le regard du lecteur, comme le type de tant d'actions généreuses que le patriotisme multiplia ce jour-là sous les murs conquis de la ville de Québec. Il suffit donc à M. de Gaspé pour venger la mémoire de nos pères, et pour étayer, dans l'imagination des contemporains, la thèse historique que Garneau avait péremptoirement démontrée à leurs esprits.

Ainsi se trouvaient réalisés l'une des plus nobles ambitions de l'auteur des *Anciens Canadiens*, et peut-être le plus puissant motif qui le fit écrire son livre.

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L'histoire, obscure ou glorieuse, grande ou petite, ne suffit pas au roman, pas plus que d'elle seule pourrait s'accommoder l'épopée. Et, d'ailleurs, M. de Gaspé reporte ses lecteurs vers des temps déjà trop reculés, vers une époque trop lointaine pour que les événements s'y dessinent dans une pure lumière de vérité. On sait comme la légende

pousse vite dans le champ de l'histoire, et comme elle y fleurit et mêle ses multiples couleurs aux sèches et arides réalités. Et le charme de la légende devient quelque chose de mystérieux et de sacré, quand elle-même se laisse envahir et pénétrer par le merveilleux.

Or, la légende et le merveilleux sont partout dans l'histoire de notre bon vieux temps; et ils laissent flotter sur les récits des anciens, et sur leurs actions le voile transparent, ondoyant et gracieux de leurs capricieuses fictions. M. de Gaspé n'avait qu'à entendre sa mère lui raconter les classiques histoires de revenants, il n'avait qu'à se souvenir des longues veillées du manoir où, par exemple, l'on évoquait l'ombre fugitive de la sorcière du domaine.¹ N'est-ce pas elle qui avait prédit les horreurs de la guerre, et tous les maux qui devaient désoler la maison des d'Haberville? Un jour, Arché, Jules et Blanche étaient allés la visiter dans la pauvre cabane où elle s'entretenait avec les esprits, et comme une pythonisse qui s'agite sur son trépied, elle avait fait retentir à leurs oreilles des paroles mystérieuses, et trois fois la malédiction était tombée de ses lèvres sur le groupe de jeunes gens qui la voulaient apaiser et consoler. "Malheur! malheur! malheur à la belle jeune fille qui ne sera jamais épouse et mère! et qui n'aura bientôt, comme moi, qu'une cabane pour abri! .

"Malheur! malheur! malheur à Jules d'Haberville, le brave entre les braves, dont je vois le corps sanglant trouvé sur les plaines d'Abraham!

"Malheur! malheur! malheur à Archibald de Lochiel. Garde ta pitié pour toi et tes amis! garde-là pour toi-même, lorsque, contraint d'exécuter un ordre barbare, tu déchireras avec tes ongles cette poitrine qui recouvre pourtant un cœur noble et généreux! Garde ta pitié pour tes amis, Archibald de Lochiel! lorsque tu promeneras la torche incendiaire sur leurs paisibles habitations; lorsque les vieillards, les infirmes, les femmes et les enfants fuiront devant toi comme les brebis à l'approche d'un loup furieux! Garde ta pitié; tu en auras besoin, lorsque tu porteras dans tes bras le corps sanglant de celui que tu appelles ton frère! Je n'éprouvé, à présent, qu'une grande douleur, ô Archibald de Lochiel! c'est celle de ne pouvoir te maudire! Malheur! malheur! malheur!"

Et la folle du domaine disparut dans la forêt; et plus tard quand Arché, en proie à tous les tourments de la prophétie réalisée contemplant, du haut d'un rocher qu'enveloppait la nuit, les derniers feux de l'incendie du manoir, il vit encore passer dans les ténèbres la folle du domaine qui étendit ses longs bras vers les ruines, et cria d'une voix lamentable sa triple malédiction. Il la vit errer à travers les débris

¹ Cf. page 155 et suivantes.

fumants, et pousser dans la nuit les trois mots liturgiques : désolation ! désolation ! désolation !¹

Et le lecteur s'imagine entendre comme un écho de la voix des antiques prophéties ; il croit apercevoir à travers le temps, et dans les plus lointaines profondeurs de la légende, la fille de Priam, Cassandre, articulant ses monosyllabes fatidiques, et annonçant au chœur des vieillards les malheurs qui menacent et qui désolent déjà le palais des Atrides.

Le merveilleux se mêle donc à l'action des personnages des *Anciens Canadiens* ; ces personnages se heurtent eux-mêmes aux êtres mystérieux qui traversent leur vie, ils en subissent ou redoutent l'influence, et c'est là l'une des façons, et certes la meilleure, d'introduire le merveilleux dans la légende et dans l'épopée.

Mais, ce n'est pas là pourtant la voie familière par laquelle de Gaspé le fait entrer dans son livre. Il y fait apparaître le merveilleux comme un épisode qu'il juxtapose à l'intrigue du roman, et qui, tout en nous faisant pénétrer plus à fond la vie des anciens Canadiens, ne laisse pas de former dans son poème comme un chant que l'on pourrait isoler du récit principal. C'est surtout sous la forme des contes étranges de José que se présente le merveilleux des *Anciens Canadiens*. Or, José, c'est le domestique, le vieux et fidèle serviteur des d'Haberville ; mais c'est aussi le type du bonhomme crédule, qui joint ensemble, par je ne sais quelle alliance bizarre et pourtant vraisemblable, beaucoup de bon sens et beaucoup de naïveté. José est une des créations les plus originales et les plus vivantes de Gaspé, et c'est lui qui va remplir deux longs chapitres du livre avec les véridiques histoires qu'il tient de "son défunt père qui est mort," François Dubé.

Presque toutes les superstitions de José tiennent dans la croyance aux sorciers et aux poursuites nocturnes et macabres de la Corriveau. Mais il adhère à ces dogmes populaires de toute la force des traditions familiales, et il les expose avec toute la sincérité d'un professeur de spiritisme. D'ailleurs, Jules et Arché, ces deux jeunes philosophes sans expérience, n'essaient-ils pas au sortir même du collège d'où il les ramène, et sur la longue route de Saint-Michel, où l'on aperçoit sans cesse à gauche, au milieu du large fleuve, l'île d'Orléans, séjour classique des sorciers, n'essaient-ils pas de discuter sur la nature de ces esprits, et ne cherchent-ils, pas comme d'impies rationalistes, à expliquer par des causes naturelles ces feux-follets que nos habitants de la rive sud voient le soir courir et s'agiter sur les grèves de l'île enchantée ? Lumières des pêcheurs, qui, pendant les nuits sombres, s'en vont avec des flambeaux faire la visite des filets, avait dit Jules ; ou bien gaz enflammés qui s'échappent parfois des terres basses et marécageuses !

¹ Page 213 et suivantes.

Véritables êtres surnaturels, reprend José, qui s'appuie sur les récits de son père, François Dubé, lorsque, pendant les longues veillées, il contait à ses enfants et à ses amis ses tribulations, et qu'il les faisait frissonner comme des fiévreux, tant ses histoires étaient vraies et terrifiantes!¹ Il les avait bien vus, lui, les sorciers, un soir qu'il revenait de la ville et qu'il avait quelque peu pintoiché avec des connaissances en passant à la Pointe-Lévis. Sur les hauteurs mêmes de Saint-Michel, au moment où vaincu par l'endormitoire il se préparait à passer la nuit sous son cabrouette, il avait vu l'île d'Orléans s'enflammer tout à coup, puis des lumières errantes danser le long de la grève. A force de les bien regarder pendant cette nuit infernale, il avait nettement aperçu les formes fantastiques de ces êtres merveilleux. Aussi bien, n'étaient-ce pas de purs esprits. "C'était comme des manières d'hommes: une curieuse engeance tout de même! ça avait une tête grosse comme un demi-minot, affublé d'un bonnet pointu d'une aulne de long; puis des bras, des jambes, des pieds et des mains armés de griffes, mais point de corps pour la peine d'en parler. Ils avaient, sous votre respect, mes messieurs, le califourchon fendu jusqu'aux oreilles; ça n'avait presque pas de chair: c'était quasiment tout en os, comme des esquelettes. Tous ces jolis gas avaient la lèvre supérieure fendue en bec de lièvre, d'où sortait une dent de rhinocéros d'un bon pied de long.... Le nez ne vaut guère la peine qu'on en parle: c'était, ni plus ni moins, qu'un long groin de cochon, sous votre respect, qu'ils faisaient jouer à demande, tantôt à droite, tantôt à gauche de leur grande dent: c'était, je suppose, pour l'affiler. J'allais oublier une grande queue, deux fois longue comme celle d'une vache, qui leur pendait dans le dos et qui leur servait, je pense, à chasser les moustiques."

Parmi ces sorciers, les uns n'avaient qu'un seul œil, comme les cyclopes, mais les autres avaient tous leurs yeux, et de ces yeux sortaient des flammes vives et ardentes qui éclairaient comme en plein jour l'île d'Orléans.

Dirigée par un chorège qui n'était qu'un sorcier plus long que les autres, puisque le père de José estima qu'il était bien aussi haut que le clocher de Saint-Michel, cette bande de lutins exécutait des danses rapides, et des rondes si enlevantes, qu'ils ne mettaient pas une minute à faire le tour de l'île d'Orléans.

C'est au moment où François Dubé, fasciné et effrayé par tant de visions inexplicables, regardait sans bouger la fête diabolique, qu'il sentit la Corriveau se grappigner amont lui, et lui étendre sur les épaules ses grandes mains sèches comme des griffes d'ours.

¹ Page 40.

Or, la Corriveau est un personnage historique qui hanta autant que les sorciers l'imagination de nos anciens. Accusée et convaincue d'avoir tué deux maris qu'elle avait successivement épousés à Saint-Vallier, elle fut pendue en 1763 sur les buttes à Neveu, près des Plaines d'Abraham; et son cadavre, emprisonné dans une cage de fer, fut exposé pour le plus grand bien de la morale publique, à la fourche des quatre chemins qui se croisent dans la Pointe-Levis. Une nuit, la Corriveau disparut avec sa cage: des jeunes gens en avaient débarrassé la Pointe-Lévis où elle affolait les imaginations, et l'avaient enfouie à quelques pas du cimetière. Mais le spectre de la Corriveau continua de poursuivre, la nuit, les esprits inquiets et craintifs; on la vit, dit-on, plus d'une fois se promener avec sa cage le long des routes où elle terrifiait les passants.

Or, ce soir-là, où le père de José fut témoin de la sérénade des mystérieux insulaires, il prit envie à la Corriveau d'aller danser avec les sorciers; et comme elle ne pouvait traverser le Saint-Laurent, qui est un fleuve béni, sans le secours d'un chrétien, elle supplia François Dubé de la transporter. Et l'on sait que sur le refus très catégorique de François, elle lui fit perdre tout sentiment, monta sur son âme et se rendit au sabbat. Ce n'est que le lendemain matin, au chant d'un petit oiseau, et lorsque déjà le soleil lui reluisait sur le visage, que le défunt père de José reprit ses sens et sa route.

De Gaspé, qui s'amuse sans doute autant que le lecteur, à entendre raconter ces mirifiques histoires, se plaît à y mêler les folles exagérations que se peut permettre une imagination qui a franchi ses bornes. Il grossit à plaisir les incidents du récit, il multiplie les prouesses des farfadets qui habitent l'île enchantée, persuadé que toute cette fantasmagorie délirante ne fait qu'ajouter plus de vraisemblance à l'élément épique de son livre. Rien ne peut étonner le lecteur qui s'est laissé ainsi transporter dans le monde du rêve et de la fantaisie héroïque. Il accepte tout ce qu'on lui dit être le naturel effet et le jeu magique des facultés merveilleuses des personnages. Et puisque nous sommes ici en compagnie des lutins, il ne paraît pas étrange que leurs sabbats soient si féériques, que leur agilité dépasse toute humaine conception, et qu'au milieu de leurs sérénades ils avertissent François Dubé qu'ils n'ont plus que quatorze mille quatre cent rondes à faire autour de l'île. On n'est pas davantage étonné d'entendre se prolonger en répercussions formidables les trois cris sataniques que poussent ensemble tous les sorciers... " L'île en fut ébranlée, nous assure José, jusque dans ses fondements. Les loups, les ours, toutes les bêtes féroces, les sorciers des montagnes du nord se saisirent de ces cris, et les échos les répétèrent jusqu'à ce qu'ils s'éteignirent dans les forêts qui bordent la rivière Saguenay."

Ainsi de Gaspé, par toutes ces légendes et réminiscences, agrandit, élargit les lignes historiques qui entourent et encadrent le sujet de son roman; ou plutôt, il fait à ce cadre de nombreuses ruptures et brèches par où entrent et pénètrent la superstition des bonnes gens et le merveilleux canadien. Les deux chapitres: *Une nuit avec les sorciers* et *La Corriveau* ne sont pas, à la vérité, indispensables au dessin de son livre, et à la suite des événements qui en constituent le fond essentiel. On pourrait concevoir l'intrigue de ce roman, sans que s'y rencontrent les sorciers et la Corriveau. Et, ainsi entendus, ces deux chapitres pourraient ne pas appartenir au premier plan que l'auteur avait organisé dans son esprit; ils seraient alors dans les *Anciens Canadiens*, dans l'épopée de l'aède de Saint-Jean-Port-Joli, ce que sont dans les anciennes épopées ces chants de développement que la critique moderne a cru nettement apercevoir, et que des poètes ont successivement brodés sur le thème primitif que leur avait légué la tradition.

Il est plus probable, cependant, et il est plutôt certain, que M. de Gaspé, qui donnait à son livre un titre si large et si vague: *Les Anciens Canadiens*, et qui se proposait donc de peindre des scènes de vie nationale plus encore que de raconter des souvenirs de famille, songeait déjà, quand il entreprit son œuvre, à toutes ces légendes et à tous ces lutins qui avaient tour à tour ravi ou terrifié son enfance, et dont la vive image amusait encore sa vieillesse. Il voulut, en ces pages qui raconteraient le passé, verser tous ses souvenirs, et nul lecteur ne lui reprochera d'avoir, par un art d'ailleurs si simple et si naturel, rattaché à l'histoire vraie la légende fantaisiste. Il ne pouvait être le narrateur complet des mœurs et habitudes anciennes, s'il ne mêlait à tous ses récits les merveilles, choses dont s'enrichit et se fortifie la crédulité populaire. C'est donc encore de l'histoire véritable que fait M. de Gaspé quand il s'attarde à décrire le bal des sorciers, ou quand il rappelle les promenades nocturnes du squelette macabre de la Corriveau.

* * *

Décrire les scènes variées et pittoresques de la vie canadienne. esquisser en quelques-unes de ses lignes les plus générales le tableau des grands événements politiques et militaires de la conquête, pénétrer avec le lecteur dans les croyances les plus familières du peuple, voilà bien à quoi s'est particulièrement employé l'auteur des *Anciens Canadiens*, et de quoi il a surtout rempli son œuvre. Mais il ne pouvait peindre tant de choses, et broser une toile si large et si profonde, sans que, au divers plans du dessin, apparussent et saillissent des personnages qui expriment toute cette variété d'objets, qui représentent, résument, incarnent la vie de l'histoire, la joie et les souffrances de la nation. Et l'art de

l'écrivain consiste, alors, à distribuer avec ordre et proportion les rôles, à situer en lumière convenable les acteurs et à les faire se grouper et se disperser, ressortir et s'effacer selon les lois multiples du relief et de la perspective.

Nous ne dirons pas que de Gaspé a ici réalisé la perfection de son art, qu'il est un metteur en scène très ingénieux, et que Scribe ne fut pas plus dextre, ni plus fertile en ressources. Les scènes elles-mêmes, où tour à tour nous transporte avec ses personnages l'auteur des *Anciens Canadiens*, sont aussi larges, aussi élevées, tantôt aussi familières, et tantôt aussi dramatiques que possible, mais le décor en est simple ou très peu compliqué, et les gestes et les paroles par où se découvrent l'âme, le caractère, la vie des acteurs sont, d'ordinaire, le mouvement sobre, le discours bref, pittoresque ou mollement verbeux, parfois indigent et terne, des gens qui ne s'étudient point.

De Gaspé n'ignore pas, lui qui a tant lu ses classiques au manoir de Saint-Jean-Port-Joli, qu'il existe un art de composer un personnage, de constituer en sa vivante complexité un caractère, d'analyser des âmes et d'en étaler les divers états sous le regard avide du lecteur; mais il ne semble pas se soucier de faire pareilles constructions ou semblables dissections; il affecte plutôt de n'apparaître pas comme un psychologue inquiet qui observe ses personnages et surprend les moindres agitations de leurs consciences; il les fait tout simplement agir, et il les laisse se mouvoir et s'exprimer le plus naturellement du monde, bien assuré que le lecteur saura bientôt saisir et retenir tout ce qui en eux les peut personifier et singulariser. Et l'on voit, en effet, au fur et à mesure que se développe l'action, et assez distinctement, se profiler, se dessiner et se préciser la silhouette, et le personnage des principaux héros.

De Gaspé n'insistera pas non plus sur la composition du portrait physique de ces personnages. Il lui suffit de nous avertir que Jules est de petite taille, qu'à dix-huit ans il est frêle, brun, qu'il a de grands yeux noirs, vifs et perçants, et que ses mouvements sont brusques et saccadés, tandis que son ami Arché est plutôt grand, robuste, avec des yeux bleus et des cheveux blonds; Arché a aussi le teint blanc et un peu coloré avec quelques taches rousses au visage et aux mains, et son menton s'accuse et se prononce fortement. Le premier est français, l'autre est écossais.

S'il s'agit ensuite de définir et de fixer l'âme et le caractère de ces deux jeunes gens, il n'y a plus guère qu'à les mettre en présence, eux, fils de deux races si différentes, et qu'à les faire se rencontrer et se heurter, se rapprocher et s'opposer.

Au collège, Jules est espiègle, railleur, taquin, tenace et indiscipliné. Il saute comme un singe sur les épaules de ses camarades, leur tire les

cheveux, descend, court à un autre, et promène ainsi par toute la cour ses folles étourderies. Mais il est spirituel en même temps que très gai, et il captive donc et retient la sympathie de tous. Au surplus, il est bon et généreux. Il paye volontiers les dettes des jeunes amis qui sont en danger d'être fouettés, et il sollicite un jour, comme un bien inestimable, cette amitié de l'orphelin qui va désormais remplir sa vie. Et il veut que cette amitié soit forte et soide, et pleine de confiance. Il éprouve le besoin de se reposer sur une âme qui soit plus calme et plus sérieuse que la sienne. Il y a donc beaucoup de gravité sous cette légèreté apparente qui emporte et égaye sa jeunesse : par quoi, certes, Jules ne laisse pas de représenter encore et très exactement l'âme française. /

Arché, qui a rapporté des montagnes de l'Ecosse, toute la mélancolie des gens du Nord, et aussi tous les deuils qui ont assombri ses années d'enfance, oppose à la mobilité toujours active de Jules la tranquillité sereine et presque froide d'une âme qui toujours s'observe et se réserve. Il s'étonne, au collège, des taquineries dont Jules le poursuit, et il ne songe pas à s'en venger, parce qu'il est le plus fort. Au reste, il est philosophe ; il s'applique à raisonner des choses, et sa méditation se change parfois en un rêve bleu de vague et langoureuse poésie. Jules se moque de la lune, quand il la voit balancer au ciel sa lampe mobile, et projeter sur la route de Saint-Thomas sa blanche lumière ; il se souvient alors qu'au dortoir du collège un rayon de lune sur les couchettes des pensionnaires n'avait pas d'autre effet que celui de lui faire regretter sa liberté perdue. Arché, au contraire, fait monter vers l'astre "à la triple essence" l'hymne de sa dévote tendresse, et il admire cette Diane qui parcourt en reine paisible, dans le silence d'une belle nuit, les régions éthérées du ciel.¹

Au reste, Arché, comme tous les écoliers graves et un peu pédants, aime beaucoup étaler ses souvenirs classiques, et il cite avec abondance ses meilleurs auteurs ; les sentences latines n'ont rien qui l'effraient, et souvent elles échappent à ses doctes lèvres, au risque de provoquer chez Jules quelque légère indignation. Et quand les deux jeunes gens ne peuvent s'entendre, et que la frivolité de Jules exaspère la gravité d'Arché, celui-ci se contente de dire avec toute l'autorité de son imperturbable sang-froid : "Oh ! Français ! légers Français ! aveugles de Français ! il n'est pas surprenant que les Anglais se jouent de vous, par dessous la jambe, en politique !" ²

L'amitié d'Arché n'en est pas pour cela ni moins délicate, ni moins profonde. Son âme s'est attachée à l'âme de Jules, comme celle de David à Jonathas,³ et jamais deux jeunes gens ne se sont aimés d'une affection

¹ Cf. pages 60-61.

² Cf. page 51.

³ Cf. page 14.

plus pure et plus dévouée. L'amitié d'Arché, pénétrée, comme elle est d'une sensible reconnaissance, prend les formes les plus aimables et les plus touchantes : elle se compose d'un respect et d'une tendresse qui en font le plus exquis et le plus louable sentiment.

Mais ce sont les vertus mêmes de ces deux amis qui les feront plus tard lutter l'un contre l'autre sur les champs de bataille. Jules est patriote autant qu'Arché lui-même est fidèle à son drapeau. Jules aime la terre natale, tous les braves censitaires qui la travaillent et la cultivent, tous ces récits et légendes que lui raconte sa mère, et qui ont poussé comme des fleurs sur le sol du pays. Quand il a quitté le collège, le bon supérieur lui a dit, comme à Arché : "Que votre cri de guerre soit : Mon Dieu, mon roi, ma patrie!"¹ Et voici que cette devise elle-même va les faire tous deux se précipiter l'un contre l'autre. Jules défend, avec toute l'énergie du désespoir malheureux, la terre française qu'on veut lui arracher de dessous les pieds ; pendant qu'Arché, victime du devoir et de la discipline impitoyable qui n'épargne ni les souvenirs, ni les amitiés, exécute des ordres barbares, souffre en silence les tourments du désespoir, et souhaiterait parfois pouvoir retourner contre lui-même cette claymore de son père qui n'a jamais trahi. Arché qui ordonne qu'on mette le feu au manoir des d'Haberville ; Jules qui, sous les remparts de Québec, essaie ses dernières forces pour percer la poitrine d'Arché, et retombe inanimé dans les bras de son adversaire : voilà des situations cornéliennes, où la volonté se mesure avec le devoir, triomphe de toutes les hésitations, et où donc se révèle toute la grandeur tragique de ces âmes romaines.

Et certes, quand un romancier a su imaginer de telles rencontres, et concevoir des luttes aussi vives où s'engagent et se torturent les consciences, il n'a guère, vraiment, qu'à raconter les événements pour en exprimer toute l'amertume, et pour en faire voir et apprécier la grandeur.

* * *

Il est un sentiment, plus intime, plus subtil et plus profond que celui du patriotisme et de la générosité héroïque, plus difficile à comprendre, à analyser et à reconstituer, surtout quand il s'efforce d'être discret, et s'acharne à s'ignorer soi-même, c'est le sentiment où la passion de l'amour. De ce sentiment il était inévitable que l'âme d'Arché, le héros sympathique du roman, se remplît et débordât quelque jour.

De Gaspé n'a pas insisté sur cet épisode, l'un des plus délicats et des plus touchants qu'il y ait dans son livre, parce qu'il ne voulait pas, au moyen de faciles intrigues et de trop sensibles émotions, détourner l'attention du sujet principal, et l'on peut dire unique, de son roman ; il n'a touché que bien légèrement une corde sur laquelle tant de romanciers

¹ Page 14.

exécutent leur troublantes variations, parce qu'il ne voulait pas, par des cris de la passion aiguillonnée et désespérée, briser l'harmonie de son chant tout patriotique.

Cependant, avec quelle grâce légère et quelle irréprochable candeur, et vif émoi il a raconté l'idylle dont fut témoin, un soir d'été, " la grève aux anses sablonneuses qui s'étend du manoir jusqu'à la petite rivière Port-Joli—" ¹ Arché s'était enfin réconcilié avec M. d'Haberville; il se disposait à vivre auprès de ses amis, et il rêvait d'unir sa destinée à celle de Blanche, à la petite sœur dont il savait l'âme si douce et si bonne. Il s'en ouvrit à elle au cours d'une de ces promenades favorites qu'il aimait faire sur le rivage, quand la marée était haute, et que le soleil couchant faisait ruisseler sa lumière d'or sur les flots. Que de souvenirs éveillait en la mémoire des jeunes gens le spectacle familial qui se déroulait à leurs regards! Et combien de fois leur innocente jeunesse avait porté sur ces mêmes rivages leurs âmes pures, enjouées et sereines! Et ce fut par toutes ces évocations du passé, par tous ces rappels de temps heureux à jamais disparus, qu'Archibald de Lochiel éprouva le besoin de saisir et de captiver l'imagination et le cœur de la jeune fille. Toutes ces choses, les moindres accidents du rivages, les rochers où l'on allait s'asseoir, le sable que l'on avait si souvent foulé, et ce petit ruisseau qu'ils franchirent encore une fois, redisaient aux deux promeneurs l'amitié fraternelle qui les avait depuis longtemps unis, et elles les invitaient encore à l'amour qui devrait les attacher désormais et lier l'un à l'autre. Arché aimait Blanche, avec cette passion respectueuse et discrète qui remplissait aussi l'âme de la jeune fille. Tous deux s'aimaient, non pas de la façon timide mais un peu précieuse des jeunes gens de Marivaux, mais d'un amour qui mesure ses mouvements à la convenance même des relations familiales, qui s'ignore aussi longtemps qu'il ne lui est pas permis de s'exprimer, et qui ne s'exprime que pour se manifester dans toute l'ingénuité et avec la franchise un peu brusque de son ardeur.

Aussi, il fallut à Arché bien des détours, et de patientes digressions, avant de se déterminer à risquer l'inévitable déclaration. Elle vint enfin, brûlant les lèvres d'Arché, et résonnant comme une étourdissante et inconcevable audace aux oreilles de Blanche. Jamais la jeune fille des d'Haberville n'avait pensé qu'il lui fût possible, malgré ses personnelles inclinations, d'épouser le soldat qui avait ravagé le domaine de son père. Elle bondit sous la flèche dont l'avait frappée Archée:

" Vous m'offensez, capitaine Archibald Cameron de Lochiel! Vous n'avez donc pas réfléchi à ce qu'il y a de blessant, de cruel dans l'offre

¹ Cf. page 297 et suivantes.

que vous me faites ! Est-ce lorsque la torche incendiaire, que vous et les vôtres avez proménée sur ma malheureuse patrie, est à peine éteinte, que vous me faites une telle proposition.” Et elle ajouta, avec une pointe de préciosité qui est bien un peu du marivaudage : “ Ce serait une ironie bien cruelle que d’allumer le flambeau de l’hyménée aux cendres fumantes de ma malheureuse patrie ! ”

Où l’on voit donc que chez Blanche, comme chez tous ces anciens Canadiens que nous a dépeints M. de Gaspé, l’amour du sol natal, le sentiment patriotique priment tous les autres sentiments et tous les autres amours. Ces gens-là s’inquiètent, avant tout, d’accorder et d’ajuster toute la vie avec l’orgueil national, et ses exigences parfois douloureuses.

Devant une opposition si vive, et peut-être depuis longtemps prévue et calculée, Arché ne put guère insister que juste comme il fallait pour montrer la vérité profonde de son dessein. Comme une autre Chimène, Blanche s’obstina dans son refus ; les sanglots parfois étouffaient sa voix, mais elle fut plus forte que sa passion. Jamais, sans doute, elle n’aura d’autre amour que celui d’Arché, mais jamais non plus, victime pieuse et volontaire de son patriotisme, elle ne donnera sa main au lieutenant de Montgomery. Et quand, à la tombée du jour, les deux jeunes gens revinrent au manoir, ils ne remarquèrent pas que l’approche de la nuit donnait à la mer, au rivage et à toute la nature une grâce nouvelle et tranquille, et un charme plus doux : leurs âmes, en proie à de trop violentes émotions, étaient insensibles maintenant à la beauté et à la poésie des longs soirs d’été.

Malgré que cet épisode, cette idylle soit si propre à émouvoir le lecteur, elle ne constitue pas une étude attentive des jeux et des combats de la passion humaine. L’auteur ne paraît pas avoir cure de psychologie ; ou plutôt, il est psychologue d’une façon qui convient à ses goûts et à son tempérament, et en ce sens qu’il tâche d’imprimer seulement à l’action des personnages le mouvement principal qui correspond à leur passion, ou à leurs divers états d’âme. La passion ainsi racontée et mise en œuvre ne fournit, nécessairement, que des portraits qui sont courts, et dont les divers traits, peu nombreux, qui les composent, laissent à l’imagination du lecteur le soin et le loisir de compléter le dessin de l’artiste.

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Ce même procédé, qui consiste à laisser les personnages se dresser eux-mêmes en pieds sous le regard du lecteur, fait que souvent il arrive qu’il faille rechercher ici et là, à travers toutes les pages du livre, les éléments qui peuvent servir à leur reconstitution. C’est ainsi qu’il sera nécessaire de recueillir un peu partout, dans ce roman, et au hasard des

circonstances, la pensée, les paroles, les gestes de M. d'Haberville, le père de Jules, si l'on veut prendre de lui une image précise. Héritier de longues traditions familiales, type parfait du seigneur canadien, esprit autoritaire et franc, conscience vigoureuse où se mêlent les vertus les plus bourgeoises, les vanités les plus chevaleresques, les instincts militaires les plus violents, et les découragements les plus profonds, M. d'Haberville est surtout soldat. Il en a toute l'ardeur et toute la crâne générosité. A son fils qui lui demande d'accueillir au manoir l'orphelin dont il s'est fait un ami, il répond: "Son père repose sur un champ de bataille glorieusement disputé: honneur à la tombe du vaillant soldat. Tous les guerriers sont frères, les enfants doivent l'être aussi."¹ Mais c'est parce qu'il est soldat, qu'il éprouvera si longtemps en son âme blessée l'effet de ce coup terrible que porta dans tous les cœurs canadiens notre suprême défaite. Son manoir incendié, son foyer ruiné, et sa patrie conquise, tant de malheurs abattus sur lui aigrirent son caractère, le firent triste et chagrin; et il ne faudra rien moins que l'autorité impérieuse d'une destinée irrévocable pour ployer cet homme, et lui faire accepter sa vie nouvelle.

Assez semblable à son frère M. d'Haberville, est l'oncle Raoul: l'oncle traditionnel, vieux garçon, utile, mais un peu sec et capricieux, comme le sont les oncles célibataires, qui vivent chez les autres, qui exagèrent parfois leur importance pour ne pas ressembler trop à des êtres parasites, qui dorlottent les petits neveux, et que l'on aime pourtant pour ce qu'ils conservent toujours en eux de jeunesse, de bravoure et de cette tendresse qu'ils ont si parcimonieusement dépensée. L'oncle Raoul a l'allure militaire, impérative; il est vif, et excessif en ses paroles et jugements; il jure avec fermeté, et quand il dialogue, il coupe l'air en tous sens avec sa canne, au risque d'attraper tous ses voisins. Au demeurant, il est bon garçon, et on l'écoute et on le respecte pour ses conseils souvent distribués, sa franchise correcte et son attachement au foyer.

Dans ce livre des *Anciens Canadiens*, où l'homme tient la première place et les principaux rôles, la femme n'apparaît que tout à fait à l'arrière plan, dans la lumière discrète de sa maison, occupée aux soins du ménage, ou présidant les réunions de famille.

Les images très douces de Madame d'Haberville et de Blanche n'occupent pas plus de place dans cette épopée que celles des femmes troyennes dans le roman historique d'Homère. C'est la vie intérieure qui symbolisent les héroïnes de M. de Gaspé, avec ses affections domestiques, ses longues conversations au foyer, et cette surveillance diligente et aimable qui assure à la femme canadienne son prestige, et sa suave autorité.

¹ Cf. page 27.

De Gaspé insistera plutôt sur la description et sur la peinture des gens du peuple, des censitaires et des domestiques, puisque, après tout, ce sont eux qui représentent le plus exactement les mœurs des anciens Canadiens. Et telles scènes de son livre rappellent ces tableaux flamands où s'étalent la bonne humeur, la vie robuste, bruyante, et grasse des bonnes gens. Ces scènes, quoique situées à l'arrière plan du roman y sont construites avec tant de relief qu'elles attirent le regard, et l'y retiennent longtemps fixé. Le seul costume de ces personnages familiers suffit à intéresser l'œil, et à donner au tableau quelques-unes de ses véritables couleurs : capot d'étoffe noire tissée dans le pays, bonnet de laine grise, mitasses et jarrettières de la même teinte, ceinture aux couleurs variées et gros souliers de peau de bœuf du pays, plissés à l'iroquoise : c'est la tenue habituelle des traversiers de Lévis, et c'est aussi, pendant l'hiver, celle des anciens Canadiens. Il n'y faut ajouter que le *bougon* de pipe inévitable, que mâchonne et déguste délicieusement le fumeur de nos campagnes.

Parmi ces personnages rustiques qui passent et repassent au fond de la scène en des attitudes si pittoresques, M. de Gaspé s'est plu surtout à mettre en bonne lumière celui du père José.

Nous ne pouvons dire, cependant, si José est exactement le type de l'habitant canadien. Sa naïve simplicité ne va-t-elle pas parfois au-delà de l'ordinaire mesure qui convient à nos gens ? Et, encore qu'il ne faille pas juger les habitants d'autrefois par ceux-là, très bourgeois, qui peuplent aujourd'hui nos vieilles paroisses, il semble bien que José, qui représente pourtant un type vécu et vu, exagère un peu en ses formes et manières l'habituelle bonhomie des anciens Canadiens. Il a gardé quelque chose de cet extravagant de François Dubé dont il est le fils, qui jurait avoir vu de ses yeux danser les sorciers, et qui avait senti la Corriveau lui grimper sur les épaules.

En tout cas, José est bien l'exemplaire fidèle du vieux domestique qui n'a vécu que pour son maître, qui a pris soin des enfants, qui s'est identifié avec tous les intérêts du seigneur, qui a sa place au foyer, qui fait partie de la famille, et qui se dévouerait jusqu'à la mort pour les gens de la maison. Il a pour son jeune maître Jules tous les égards respectueux et les sollicitudes les plus touchantes. L'incendie du manoir l'attristera presque autant que M. d'Haberville lui-même. Avec cela qu'il est patriote comme tous ceux qui ont assisté et pris part aux guerres de 1760. N'a-t-il pas perdu—ou oublié, comme il dit—sa main droite sur les Plaines d'Abraham ? ¹

Un jour—c'était plusieurs années après la cession du pays aux Anglais—il conduisait Arché à Québec. "Voici la ville," dit-il à son com-

¹ Page 293.

pagnon de route, des qu'il l'eut aperçue là-bas devant lui; "mais pas plus de pavillon blanc que sur ma main, ajouta-il en soupirant. Et pour se donner une contenance, il chercha sa pipe dans toutes ses poches en grommelant et répétant son refrain ordinaire: "Nos bonnes gens reviendront." ²

L'affection qu'avait José pour ses maîtres, ils la lui rendaient bien; et il n'y a guère de pages plus touchantes dans tout le roman de M. de Gaspé que le récit de la mort de José s'éteignant doucement au manoir dans les bras de Jules, sous le regard attendri des petits enfants que l'on avait fait venir exprès du collège, pour que le vieillard les put revoir avant de s'en aller pour toujours. On sent que l'auteur a mis dans cette page de son livre toute l'âme bonne et attendrie que lui ont faite les patriarcales traditions du manoir: et l'on est heureux, tout comme de Gaspé lui-même, de voir une mort si calme et si honorable finir et couronner une vie si dévouée et si fidèle.

* * *

Parmi tous ces personnages du roman que l'on aime à se rappeler, et qui se profilent dans nos imaginations avec leurs allures singulières, il en est un autre qu'il est impossible de ne pas apercevoir presque à chaque page, et que l'on ne peut donc oublier: et c'est celui de l'auteur lui-même.

L'auteur compte toujours parmi les personnages d'un roman, si impersonnelle que soit l'œuvre, et si discret que soit l'ouvrier. S'il ne se mêle directement à l'action, et s'il ne s'agit pas lui-même sur la scène, on sent bien qu'il est là, dans la coulisse, qui fait mouvoir les acteurs, et leur dicte leurs rôles. C'est sa pensée, c'est son sentiment personnel qui souvent s'expriment; il s'incarne avec l'une ou l'autre de ses créatures, et il s'identifie avec elle. C'est, d'ailleurs, son cerveau qui produit toute la pièce, et la marque d'une empreinte plus ou moins originale et puissante. Et comme de notre personnalité la substance la meilleure et la plus précieuse, c'est la pensée intime, la conviction profonde, les affections et les jugements, il suit de là que nul personnage ne s'étale, en un roman, avec plus d'ampleur et, parfois, avec plus de complaisance, que l'auteur lui-même. Et l'on peut donc, avec les œuvres écrites, reconstruire assez exactement la mentalité, et l'âme de celui qui les a conçues.

Dès lors, il serait possible de dessiner ici le portrait moral de M. de Gaspé; il n'y aurait qu'à surprendre et saisir sa pensée partout où elle se découvre et s'annonce. Aussi bien, parfois, et malgré la discrétion et la retenue habituelle dont il faut le louer, et qui donnent à son œuvre

² Page 313.

une suffisante mesure d'impersonnalité, il arrive que l'auteur des *Anciens Canadiens* fait lui-même, et brusquement, irruption dans son livre, se mêle aux personnages, parle pour son compte, rappelle ses souvenirs,¹ et prononce d'autorité ses propres jugements. Si bien que non seulement la vie des anciens Canadiens, mais la vie même de M. de Gaspé afflue dans son œuvre, et s'y concentre, s'y répand et en déborde. Ce roman est, en vérité, une première série des *Mémoires*. Ce sont les premières confidences de l'auteur au public. L'un des principaux héros du livre, M. d'Haberville, n'étant pas autre, en réalité, que le grand-père de M. de Gaspé cet Ignace-Philippe-Aubert qui fit rudement son devoir de soldat dans les guerres de la conquête, et dont le manoir fut incendié par les Anglais,² le petit-fils ne pouvait s'empêcher de raconter ses souvenirs, de consulter sa propre vie, de dire ses impressions, et de nous révéler l'âme que lui avait façonnée la religion du foyer. Il voulut même aller jusqu'à des confessions douloureuses, et livrer aux lecteurs ce qu'il aurait pu facilement leur cacher : sous le masque de M. d'Egmont, il raconte les extravagances, les poignantes angoisses, les tristesses fatales de son existence propre.

Aussi, quand on ramasse et recueille, ici et là, les réminiscences, les enthousiasmes, les ironies et les haines, les aveux et les regrets de l'auteur, et que l'on prend garde à la façon dont tout cela est dévoilé, exprimé et raconté, on voit peu à peu se reformer sous le regard de l'imagination la physionomie de l'écrivain, ses états d'âme, et se dessiner et s'accuser les lignes principales de son portrait.

Et ce portrait psychologique ressemble assez, croyons-nous, au portrait physique que l'on a gardé de ce septuagénaire. Il n'y a pas, certes, que de la bonhomie dans ce visage de vieillard où la vie avait imprimé de si multiples et diverses sensations. Il y a aussi traces de pensées élevées, de passions ferventes, de tristesses mélancoliques. Cette physionomie est même plutôt chagrine : les lèvres qui sont épaisses, couvertes d'une forte moustache, et qui se ferment lourdement sous un nez trop gros, ne paraissent pas s'ouvrir facilement pour les rires fins et légers ; la gaieté soudaine, gauloise et burlesque des conteurs populaires devait être plutôt la sienne. Il y a, d'ailleurs, quelque chose d'un peu nonchalant, de trop abondant et d'excessif dans ces traits inférieurs du visage, qui sont si fortement marqués, où le menton frais rasé et large s'en va fuyant sous la barbe blanche qui enveloppe la gorge et recouvre les joues. En revanche, le front haut, bien dégagé, repose très noblement sur l'arcature saillante des sourcils, et semble bien fait pour les silencieuses médi-

¹ Voir, par exemple, à la page 148, le souvenir de sa prière pour les morts que lui faisait, chaque jour, réciter sa mère.

² Cf. *Biographie de M. de Gaspé*, par l'abbé Casgrain, dans *Œuvres Complètes* II, 250.

tations. Le regard lui-même ne porte pas tout entier sur les choses extérieures; abrité sous le pli large et retombant des paupières, à la fois ferme et bon, il semble se tourner plutôt vers le monde intérieur des pensées et des souvenirs. Les paupières inférieures, que l'on dirait avoir été gonflées par les larmes, et qui s'affaissent mollement jusqu'au ride profond qui les découpe en demi-cercle et les relève, ajoute encore à la mélancolie de cet œil un peu mystérieux et voilé.

C'est avec cette physionomie complexe que M. de Gaspé apparaît dans son livre. Tour à tour joyeux et triste, naïf et philosophe, passionné et bon enfant, aristocrate et homme du peuple, il exprime avec une grande variété d'attitudes les sentiments qui emplissent son âme canadienne. Mais, puisque c'est une page d'histoire qu'il a surtout voulu écrire, il n'est pas étonnant que ce soit son patriotisme, très sensible, souvent meurtri, confiant ou irrité, qui s'y traduise le plus volontiers et le plus souvent.

M. de Gaspé intervient donc dans les récits et l'action du roman pour nous dire, sur la vie politique de son pays, sa pensée personnelle, pour apprécier les faits, et soulager sa conscience qu'il avait tenue si longtemps fermée. Non pas qu'il ait sur les événements qu'il raconte, ou auxquels il fait allusion, des réflexions bien neuves ou profondes. M. de Gaspé est plutôt l'écho et l'interprète des pensées communes qui agitent et mènent la foule; il les exprime seulement avec plus d'éloquence que ne fait le peuple; il leur donne la tournure oratoire qui lui est familière. Sa rhétorique a bien parfois je ne sais quoi de convenu et de banal qui est trop souvent le propre de l'éloquence politique, mais elle prend aussi sur les lèvres ou sous la plume de ce vieillard une solennité, une sorte de majesté qui impose le respect.

Rien n'est plus caractéristique, à ce point de vue, que l'hommage enthousiaste que de Gaspé rend à la mémoire des guerriers, morts ou vivants, vainqueurs ou vaincus, qui combattirent sur les Plaines d'Abraham. Le romancier interrompt brusquement son récit pour y intercaler trois développements, trois strophes où chante sur le mode lyrique le patriotisme le plus large et le plus humain.¹

Il y a, au contraire, de l'amertume, de l'ironie et du sarcasme, dans les premières pages du chapitre où l'on raconte cet épisode des Plaines d'Abraham. Et les lèvres pesantes du vieillard ont dû se plisser dans un sourire bien dédaigneux, quand il a écrit contre les stratégistes de cabinet qui peuvent reprocher à Montcalm sa défaite, le commentaire ardent du *Vae victus!*²

Au surplus, M. de Gaspé—et il ne fait encore ici que rendre la pensée de tous les Canadiens—ne s'afflige pas plus qu'il ne faut du fait

¹ Pages 248-249.

² Pages 239-241.

de la cession du Canada à l'Angleterre. "Nous vivons plus tranquilles sous le gouvernement britannique que sous la domination française,"¹ dit un jour Jules à Arché, et M. de Gaspé lui-même se félicite de ce que la révolution de 1793, avec toutes ses horreurs, n'a pas pesé sur cette heureuse colonie que protégeait le drapeau d'Albion. Nous avons d'ailleurs cueilli de nouveaux lauriers en combattant sous les glorieuses enseignes de l'Angleterre! et deux fois la colonie a été sauvée par la vaillance de ses nouveaux sujets."²

Sans doute, nous avons eu à nous défendre contre les Anglais eux-mêmes qui s'attaquèrent à notre existence nationale; mais ces luttes, elles aussi, furent glorieuses. "A la tribune, au barreau, sur les champs de bataille, partout, sur son petit théâtre, le Canadien a su prouver qu'il n'était inférieur à aucune race." M. de Gaspé exhorte aux combats persévérants ses compatriotes: "Vous avez lutté pendant un siècle, ô mes compatriotes! pour maintenir votre nationalité, et grâce à votre persévérance, elle est encore intacte; mais l'avenir vous réserve peut-être un autre siècle de luttes et de combats pour la conserver! Courage et union, mes compatriotes!"³

Ces paroles sont bonnes et réconfortantes: et le lecteur les recueille avec respect quand il parcourt aujourd'hui ces pages qui furent écrites au milieu du siècle dernier. Et en les feuilletant, il songe aux luttes inévitables du temps présent. Il y reconnaît comme des accents prophétiques qui voudraient prévenir les désordres de l'avenir, et grouper autour de l'idée nationale les Canadiens français du vingtième siècle. Non pas qu'il soit désirable que des jalousies et des haines occupent nos âmes canadiennes. Nous devons plutôt nous unir aux Anglais puisque nous sommes ici les fils d'une même patrie et que nous sommes frères au même foyer. Mais nous, Canadiens français, nous ne pouvons pas ne pas céder à l'instinct de conservation qui féconde les races et les fortifie, et nous ne pouvons donc oublier que dans les commerces nécessaires de notre vie nationale, il faut, par une sorte d'ironie des mots et de la fortune, tout à la fois nous unir à nos voisins et nous opposer à eux: nous unir avec eux pour faire ensemble prospérer et grandir la patrie commune, mais nous opposer les uns aux autres, dans une attitude calme et respectueuse, pour garder vivantes et libres, avec toute la richesse de leur sang et la variété belle et légitime de leurs langues, les deux races qui possèdent le sol canadien.

C'est cette alliance, et c'est cette pacifique opposition des races que M. de Gaspé a paru d'abord comprendre et prêcher. Il ne semble pas,

¹ Page 333.

² Page 202.

³ Page 202.

cependant, qu'il ait toujours eu sur ce sujet une pensée suffisamment nette, et invariable. L'on peut croire que l'anglomanie, qui a sévi au siècle dernier dans quelques-unés de nos familles bourgeoises et aristocratiques, a quelque peu fait fléchir son patriotisme. Sans jamais conseiller ouvertement la fusion, dans ce pays, des deux races anglaises et françaises, il accepte volontiers que des mariages mixtes fassent se rencontrer et se mêler les deux sangs. Blanche a bien un mot très fier quand Jules lui propose d'épouser Arché, qui représente à ses yeux la race des conquérants: "Est-ce une d'Haberville qui sera la première à donner l'exemple d'un double joug aux nobles filles du Canada?"¹ Mais elle consent à ce que Jules prenne lui-même pour femme une Anglaise, et elle va jusqu'à dire ceci qui est le mot malheureux: "Il est naturel, il est même à souhaiter que les races française et anglo-saxonne, ayant maintenant une même patrie, vivant sous les mêmes lois, après des haines, après des luttes séculaires, se rapprochent par des alliances intimes; mais il serait indigne de moi d'en donner l'exemple après tant de désastres."²

M. de Gaspé a mieux aimé que ce fût Jules qui donnât l'exemple de ces alliances hybrides où trop de nos familles canadiennes-françaises ont depuis et peu à peu sacrifié les traditions et la langue des ancêtres. L'auteur des *Anciens Canadiens*, que, d'ailleurs, des relations étroites avaient, dès son enfance, mis en contact avec l'aristocratie anglaise de Québec,³ ne pouvait plus mal choisir, parmi les personnages de son roman, celui qui serait chargé de donner aux lecteurs, en manière d'épilogue, cette leçon d'anglomanie. C'est le chevalier des Plaines d'Abraham qui désarme tout à fait, et accroche au mur d'un foyer où va régner l'anglaise la panoplie de son trophée! C'est le Roland des légendes allemandes qui oublie, semble-t-il, aux pieds d'une femme le motif et l'héroïsme de sa vie.

Il est donc possible, et nous croyons qu'il est certain, que M. de Gaspé a poussé trop loin ce sentiment de résignation nationale auquel il a fallu obéir après la conquête, mais auquel M. d'Haberville a lui-même et d'abord si longtemps résisté. Et si l'historien avait le droit de traduire dans son livre cette sorte de satisfaction que nous éprouvons d'avoir, par le fait de la conquête, échappé à tant de mesquines persécutions qui ont affligé et qui affligent encore la France, le romancier n'avait pas, lui, le droit de pousser jusqu'à cette extrême limite le dévouement

¹ Page 337.

² Page 337.

³ On sait que la mère de M. de Gaspé, Catherine Tarieu de Lanaudière, était amie intime de Lady Dorchester. Les deux filles de Lady Dorchester passaient souvent une partie de l'été au manoir de Saint-Jean-Port-Joli. On peut consulter, à ce sujet, la *Biographie de M. de Gaspé*, écrite par l'abbé Casgrain, dans *Œuvres Complètes*, de l'abbé Casgrain, II, 273.

de toute notre vie à la cause britannique, et il avait plutôt le devoir d'enseigner à ses compatriotes comment les races conquises ne meurent pas, et de tracer à la fin de son œuvre, et d'indiquer sommairement aux romanciers futurs le canevas ou le thème des *Oberlés* canadiens.

Le patriotisme de M. de Gaspé, que montrent et définissent les *Anciens Canadiens*, est donc assez complexe : il est surtout fait de sentiments très fervents pour l'honneur et les traditions de sa race, d'ironie mordante pour ceux qui osent toucher à nos gloires les plus pures, d'espérances en l'avenir, et d'abandon parfois trop confiant aux destinées que nous pouvait préparer ici l'influence aborbanse des vainqueurs de 1760. Cette âme si canadienne et qui s'émeut, s'enflamme, s'exalte au souvenir du vieux passé, qui a des ardeurs de combat pour raconter nos résistances et nos luttes, se détend, à la fin, et s'apaise et se résigne ; et elle montre ainsi, dans ses discours et dans tout ce qui manifeste sa conception de la vie nationale, les mêmes variations et contrastes que l'on peut aussi apercevoir dans la philosophie qu'elle nous a donnée de la vie humaine.

* * *

L'on pourrait croire, que ce vieillard qui sourit à travers tant de pages de son livre, qui s'abandonne à une gaieté large et franche quand il raconte les histoires de José, et qui fait si attachante la destinée de ses héros, a aimé la vie et l'a vécue avec enivrement. Et il suffirait de lire encore dans les *Mémoires* le récit de ses aventures avec Coq Bezeau pour se persuader qu'un enfant qui entra si joyeusement dans la vie active, devait s'y attacher pour toujours. Et, pourtant, les *Anciens Canadiens* nous révèlent en M. de Gaspé, dans son âme de vieillard philosophe, toutes ces oppositions de joie et de tristesse, de consolations et d'amertumes, de sérénité et de dégoûts qui apparaissent sur son visage. Pour que cette mélancolie n'étendît pas sur tout le roman son voile sombre, M. de Gaspé a voulu ramasser en un seul chapitre ses plus graves impressions, et y exprimer tout ce qu'il pensait des hommes et de la société.

Dans ce chapitre intitulé *Le bon gentilhomme*, M. de Gaspé s'est mis en scène lui-même, et sous le pseudonyme de M. d'Egmont, le solitaire de la rivière des Trois-Saumons, il a fait l'aventure pénible de sa vie, et livré au lecteur sa conscience jamais apaisée.

Deux sentiments surtout résument toute cette morale, et toute cette conférence que fait à Jules le bon gentilhomme : celui d'une misanthropie assez profonde, et celui, plus chrétien, et qui sert à l'autre de correctif, d'une pitié grande pour ce barbare civilisé qu'est l'homme lui-même.

De Gaspé avait d'abord aimé la vie; il l'avait embrassée avec passion et volupté dans sa jeunesse, alors qu'à lui, seigneur et maître d'une assez belle fortune, elle ouvrait des perspectives de lumière sans ombre, et des chemins tout semés de fleurs. Avocat au barreau de Québec, puis bientôt shérif, il s'installa avec confiance dans cette situation qui lui permit de continuer les plaisirs insoucians qui avaient réjoui ses vingt ans. Il obligea sans compter les amis qui se groupent toujours nombreux et avides autour de celui qui a de l'argent; il distribua au hasard ses largesses et son bien; il s'étourdit dans les fêtes dont s'enivrait son existence; il mêla et confondit ses ressources personnelles et celles de l'Etat, et quand, un jour, M. de Gaspé s'éveilla de ce rêve où s'était abîmée sa fortune, il était trop tard. Ses amis le quittèrent, firent le vide autour de lui, et l'abandonnèrent aux créanciers qui, le trouvant insolvable, le firent enfermer pour quatre ans dans une prison.

Il faut lire, dans le texte lui-même, le récit que fait M. d'Egmont des extravagances, des joies, des cruelles déceptions de sa vie. Et il faut recueillir de ses lèvres, pendant l'entretien de ce philosophe avec Jules, au bord d'un ruisseau où se mirent les branches touffues d'un noyer, les leçons qu'il dégage des accidents de cette vie. C'est un dialogue dont la mise en scène fait penser à ceux de Platon; on dirait le jeune Phèdre, assis aux côtés de Socrate, sur les bords de l'Ilissus. Mais cette fois Socrate désespère de corriger les Athéniens, de les rendre meilleurs, et il étale avec quelque complaisance le plus sombre pessimisme.

"Tout homme qui, à quarante ans, n'est pas misanthrope, n'a jamais aimé les hommes," disait Chamfort, et cette parole sert d'épigraphe à la leçon du bon gentilhomme. C'est parce qu'il a beaucoup aimé les hommes et la vie, lui, qu'il est devenu à son tour misanthrope. Il a éprouvé de la vie tout ce qu'elle contient de déceptions, et des hommes tout ce qu'ils peuvent en fait d'ingratitude. Et voici bien, en effet, ce qui afflige M. d'Egmont ou M. de Gaspé. L'homme mériterait qu'on le définisse un animal ingrat. Il exprime de ses semblables, de ses voisins, de ses amis tout ce qu'il en peut tirer, et si quelque malheur vient à frapper ceux qui lui ont été le plus utiles, il s'en détourne il les lâche, il s'enferme dans son égoïsme. De là pour les malheureuses victimes abandonnées par l'amitié les souffrances morales les plus aiguës. Et parce que, de toutes les tortures qui peuvent affliger l'homme, celles-là, intimes et profondes, qui tourmentent l'esprit et tenaillent le cœur, sont les plus cruelles, il en résulte que M. d'Egmont avait épuisé la coupe d'amertume, et que de l'avoir épuisée le faisait désespérer de pouvoir jamais plus estimer les hommes. Il ramène toutes ses observations sur la vie à ce dogme de la perversité et cruauté humaines. Et si un jour, en sarclant ses laitues, il voit les fourmis se précipiter sur un insecte blessé et le dévorer, il ne peut se retenir de faire tout haut cette réflexion

que La Bruyère eût approuvée : ces petites bêtes sont donc aussi cruelles que les hommes !

La jeunesse seule, selon M. d'Egmont, a gardé sa grâce et sa vertu. La jeunesse sait encore apprécier le bienfait, remercier ses bienfaiteurs. Les jeunes gens sont naturellement bons, ils sont reconnaissants... et les sauvages aussi. Et cela prouve que c'est l'intérêt et la civilisation qui tuent la gratitude. Tous deux ont banni de cette terre la fleur exquise des amitiés constantes ; tous deux brisent des chaînes qui devraient être plus fortes que le malheur. Aussi longtemps que l'homme n'est pas aux prises avec les multiples et égoïstes intérêts que met en jeu la vie sociale, aussi longtemps que les lois elles-mêmes n'ont pas perverti chez lui la notion du juste et de l'injuste, il reste bon, et capable de comprendre l'équité. Que si vous doutez de la vérité de cette doctrine, interrogez ce brave homme d'Iroquois à qui un magistrat faisait un jour visiter, à New-York, le grand wigwam où l'on détient les repris de justice. "C'est là qu'on enferme les Peaux-rouges qui refusent de livrer les peaux de castor qu'ils doivent au marchand," disait le visage pâle à l'enfant de la forêt. Et celui-ci de visiter avec soin tout l'édifice, de descendre dans les cachots, de sonder les puits, de prêter l'oreille aux moindres bruits, et de conclure par un immense éclat de rire : "Mais sauvage pas capable de prendre castor ici ?" dit-il ; et dans ce mot, et dans ce rire, il y avait tout le mépris et tout le dédain que la barbarie doit à la civilisation. Cet indien avait compris, là, tout ce que notre justice boîteuse contient d'illogisme, et comme il est inutile, cruel et contradictoire d'enfermer, et donc de paralyser et d'empêcher d'acquiescer celui dont le crime est de n'avoir pas de quoi payer ses dettes.

Si misérable que soit l'homme, et si faux que soient ses jugements, et si endurcie que soit sa conscience raffinée et civilisée, il le faut pourtant plaindre, et l'on doit en avoir pitié. Et le pessimisme de M. d'Egmont est donc ici traversé d'un rayon de lumière et de charité qu'on ne s'attendait pas tout d'abord d'y apercevoir. Cet Alceste paraît bien avoir

ces haïnes vigoureuses
Que doit donner le vice aux âmes vertueuses,

mais il a aussi pour son semblable des complaisances de Philinte ; et s'il s'est enfoncé en son désert, s'il a

cherché, sur la terre, un endroit écarté,
Où d'être homme d'honneur on ait la liberté,

il sait aussi sortir de sa retraite pour aller à ceux qui souffrent et qui ont besoin de son secours. Il est lui-même la vivante et persuasive con-

tradiction de sa doctrine. Il n'a pu éteindre en son âme les affections généreuses de sa jeunesse, et il se console de ses tristesses en faisant beaucoup de bien à ceux qui souffrent. Il va porter aux malades et aux pauvres les fruits de son jardin, et les racines bienfaisantes et les simples dont ses études lui ont révélé la vertu médicinale. Bref! on appelle ce misanthrope le bon gentilhomme, et M. de Gaspé ne pouvait en un plus violent contraste de mots et de faits résumer sa philosophie de la vie, et définir sa complexe mentalité.

Il faut retenir que c'est un nom très doux, un vocable très généreux qui sert à marquer et à distinguer entre tous les hommes M. d'Egmont. Il est le bon gentilhomme. C'est la bonté qui excelle dans sa vie, et c'est elle aussi sans doute qui console l'existence de M. de Gaspé. Nature faite tout entière de vertus ardentes et de passions capables de devenir excessives, l'auteur des *Anciens Canadiens* devait traduire sa vie par des oppositions vives et des rencontres originales; il devait la pénétrer des grâces et du charme séduisant de la bonté. Léger, joyeux, confiant dans sa jeunesse, triste bientôt de tous les mécomptes de ses trente ans, retiré dans son manoir après les années de captivité, estimant que sa vie était désormais sans profit pour lui et pour les autres,¹ mais résigné pourtant, et calme, et essayant de retrouver dans la paix du foyer la joie ancienne et bonne; refoulant sans cesse au fond de sa mémoire le souvenir des jours mauvais, et gardant volontiers à ses lèvres de doux vieillard le sourire des affections paternelles; facilement triste et chagrin quand surgit tout à coup à ses yeux le passé ineffaçable, capable aussi de trouver dans les lectures en famille, et dans les méditations de son esprit toujours alerte, la consolation et l'oubli: tel fut M. de Gaspé. Ce sont, en vérité, toutes ces alternatives de joie et de regrets, et ces jeux d'ombre et de lumière que l'on aperçoit dans son portrait, et c'est cela aussi qui apparaît à travers les pages si variées qu'il a écrites: tour à tour pleines de gaieté abondante et copieuse, parfumées de christianisme bienfaisant, frémissantes d'enthousiasme et de passions, et parfois aussi humides et baignées de larmes.

* * *

Faut-il ajouter que les qualités littéraires et les défauts de l'artiste qui a conçu l'œuvre et l'a exécutée, pourraient encore révéler à leur tour son esprit et son tempérament.

Sans doute, il est assez difficile d'apprécier et de cataloguer un écrivain qui déclare en manière de préface qu'il n'a pas l'intention de composer un ouvrage *secundum artem*, qu'il n'écrit que pour s'amuser, qu'il entend bien avoir ses coudées franches, ne s'assujétir à aucune des règles qu'il connaît, et qui conseille simplement au lecteur de laisser là

¹ Cf. page 180.

son livre s'il l'ennuie.¹ Cependant, il est possible de reconnaître, sous ce désordre apparent, le talent de l'écrivain. Et, par exemple, il ne sera pas malaisé de remarquer qu'il y a à la fois de la bonhomie et de l'étude dans ce livre, et que la simplicité y cotoie la rhétorique.

Que M. de Gaspé ait librement laissé trotter sa plume sur la rame de *papier-bonnet* qu'il acheta un bon matin chez son libraire, cela est incontestable, et se peut déduire de la façon même dont l'œuvre est conduite. Il y a dans ces pages une sorte de facilité, abondance et verbosité qui suppose chez l'écrivain l'abandon confiant et sincère de sa pensée à la bienveillance du lecteur. Et cette générosité et prodigalité de paroles, qui risquerait, en d'autres livres, de nous lasser et ahurir, est ici précisément ce qui retient, captive et entraîne en son flot l'attention et la curiosité. On se laisse emporter d'un bout à l'autre du livre, et l'on ne songe pas qu'il faut s'arrêter et se reposer.

Et ceci vient encore, sans doute, de ce que M. de Gaspé, pour cela qu'il s'abandonne à sa passion de raconter et de muser un peu, donne à celui qui le lit l'impression très agréable qui se dégage toujours d'une œuvre où s'exprime sans effort la bonne nature. La plupart des scènes qu'il décrit ressemblent beaucoup à ces tableaux rustiques de Corot que l'on voit au Louvre, et qui sont signés du "peintre le plus naturel de la nature." La vérité s'y moutre et plait sans détour, elle s'y étale et brille de tout l'éclat de sa belle sincérité. Et jamais l'on ne résiste à de tels séductions et entraînements. Le lecteur est toujours si heureux de rencontrer un homme là où il s'attendait et redoutait de trouver un auteur!

L'art de M. de Gaspé n'est donc pas celui des stylistes de profession; il ne se rattache en aucune façon à la manière de Flaubert ou à celle des Goncourt; il a plutot quelque chose de l'art des primitifs; il fait penser parfois, et toutes proportions gardées, à la tenue aimable et négligée d'un Montaigne, à la bonne grâce et naïveté d'un Joinville ou d'un Hérodote.

Il ne faut pas se dissimuler pourtant que M. de Gaspé pousse parfois jusqu'à l'excès le souci qu'il a de composer sans recherche et sans cérémonie: L'on voit, par exemple, qu'il se laisse trop facilement attarder par des digressions qui coupent le récit et nous en distraient. Et l'on peut constater encore que les chapitres du livre ne sont pas toujours nettement délimités, ni la matière suffisamment bien distribuée. Le titre même du chapitre ne correspond pas toujours exactement au sujet qu'il paraît indiquer, et on le peut vérifier facilement avec les chapitres sixième et septième.

¹ Cf. pages 5-8, *passim*.

Il n'est pas inutile de rappeler, ici, que l'abbé Casgrain a quelque peu remanié, du consentement de l'auteur qui lui avait confié son manus crit et avec qui il corrigea les épreuves, le commencement et la fin du roman. Le premier chapitre et le dernier avaient des longueurs interminables; le vieillard causait, causait sans tarir. L'abbé Casgrain coupa dans le vif de ces trop longs développements, et ce sont là, d'ailleurs, les seules retouches appréciables qu'il fit à cette œuvre. Nous tenons de l'abbé lui-même, avec qui nous en parlions un jour, qu'il a respecté tout le reste du texte. Il ne faudrait donc pas accepter trop facilement l'opinion de ceux qui ont pensé et affirmé que les *Anciens Canadiens* avaient été trop soigneusement et trop largement revus et corrigés par Casgrain.¹

¹ Voir encore, à ce sujet, les *Mémoires ou Souvenances Canadiennes* inédites de l'abbé Casgrain, III, 24, 20-21. Nous croyons intéressant de mentionner ici le fait très peu connu que M. de Gaspé, désireux de reconnaître les services que lui avait rendus l'abbé Casgrain, voulut lui dédier son livre, et écrivit donc à l'abbé une lettre-dédicace que celui-ci, "moins par modestie que par la répugnance invincible qu'il éprouvait à paraître se mettre en évidence," crut devoir refuser. L'abbé Casgrain reproduit cette lettre dans ces *Souvenances*, III, 24, 22-23. Voici cette page que M. de Gaspé avait voulu mettre en tête de son roman:

M. l'abbé,

Le sentier que j'avais à parcourir, lorsque je commençai à écrire les *Anciens Canadiens* me paraissait jonché de fleurs, mais je dus m'apercevoir bien vite qu'il était, au contraire, couvert de ronces et d'épines. Je continuai, néanmoins, espérant franchir tous les obstacles de cette route pénible. Le bandeau ne me tomba des yeux qu'à la lecture de l'ouvrage, quand il fut achevé. Bah! pensai-je, je n'aurai toujours pas perdu mon temps: je laisserai mon manuscrit comme un souvenir affectueux à ma nombreuse famille; et à cette fin, je l'enfermai bien précieusement dans mon tiroir, d'où vous l'avez retiré pour le livrer à l'impression, malgré ma répugnance.

Si j'étais capable d'autres sentiments envers vous, M. l'abbé, que de ceux de l'amitié la plus sincère, je vous conserverais de la rancune pour un acte aussi téméraire! N'importe; je me permettrai toujours de vous faire une petite espièglerie en vous dédiant, à vous, littérateur distingué, malgré votre jeunesse, à vous, protecteur dévoué de la bonne littérature canadienne, cette œuvre éphémère.

Vous avouerez, M. l'abbé, que c'est assez mal reconnaître les excellents conseils que vous m'avez donnés, les soins que vous donnez à l'impression de mon ouvrage, que de chercher à vous rendre solidaire de ses défauts; mais la vieillesse est rancunière.

Ce qui n'empêche pas, M. l'abbé, de me souscrire avec une considération très distinguée, votre serviteur dévoué et ami.

L'AUTEUR.

On trouvera l'original de cette lettre dans le premier volume de la collection des *Lettres diverses* manuscrites de l'abbé Casgrain, conservées aux Archives du Séminaire de Québec.

Au reste, le style même de M. de Gaspé diffère assez de celui de l'historien de la Mère Marie de l'Incarnation, pour qu'il soit facile de reconnaître, dans les *Anciens Canadiens*, la marque de l'auteur. Il y a ici une simplicité et un naturel auxquels ne nous a guère habitués l'abbé Casgrain de 1860.

M. de Gaspé excelle à imiter et à reproduire dans son style le langage familier, tout court, plein de saveur des Canadiens, ses contemporains. Il se plaît à exprimer sa pensée comme il faisait sans doute dans son salon de famille, quand il y causait avec les siens sous le regard des ancêtres dont les portraits étaient suspendus au mur; ou bien encore il prend volontiers le ton des longues conversations qu'il avait souvent avec les braves habitants de Saint-Jean-Port-Joli. C'est en style canadien que devait être écrit le roman historique ou l'épopée populaire des *Anciens Canadiens*. M. de Gaspé le voulait ainsi; d'autant qu'il lui eût été difficile d'adopter une autre manière et d'autres procédés. "Cet ouvrage sera tout canadien par le style: il est malaisé à un septuagénaire d'en changer comme il ferait de sa vieille redingote pour un paletot à la mode du jour."¹

C'est donc en vieille redingote que se présente la phrase de M. de Gaspé, et c'est encore aujourd'hui ce qui donne au livre sa valeur et lui conserve tout son prix. On se plaît toujours à y entendre le parler des bonnes gens, et à voir se peindre en leur langage les mœurs d'une époque dont nous nous éloignons chaque jour si rapidement.²

L'aisance et la simplicité du vocabulaire des *Anciens Canadiens* se retrouvent parfois et plus particulièrement dans les dialogues que l'auteur établit entre les personnages du roman. Le dialogue doit rendre plus parfaite pour le lecteur l'illusion de la réalité, et c'est bien en pleine réalité que nous transportent des causeries comme celles du souper que l'on prend chez un seigneur canadien, M. de Beaumont,³ ou bien encore les propos si vifs et si spontanés du père Josué.

Il convient, pourtant, d'observer ici que les dialogues de M. de Gaspé ne sont pas toujours aussi alertes, aussi coupés et primesautiers qu'ils pourraient l'être quelquefois. Il arrive que le dialogue tourne au discours et que les conversations se transforment en trop longs monologues. Au reste, il semble que le talent de M. de Gaspé, qui est bien celui d'un conteur, est aussi très oratoire. Et cette tendance le fait souvent exprimer sous forme de harangues éloquentes même les pensées solitaires de ses personnages. C'est ainsi qu'Arché, qui a été condamné à mettre le feu au manoir des d'Haberville, et qui souffre donc malgré lui toutes les tortures du remord, monte tantôt sur une colline, et tantôt sur un cap pour exhaler en de violentes philippiques dirigées contre Montgomery, ou contre la civilisation, ou contre lui-même, sa douleur et sa colère. "Alors, il s'écria. . . Voilà donc, s'écria-t-il. . ." Et, en vérité, il est peu naturel qu'un soldat fût-il lieutenant, qui est seul à

¹ Cf. pages 7-8.

² M. l'abbé F.-X. Burque a relevé dans le *Bulletin du Parler français au Canada*, IV, 61, 101, 142, 182, quelques-unes des expressions canadiennes, typiques, employées par M. de Gaspé dans les *Anciens Canadiens*.

³ Cf. chap. VI.

dévorant son chagrin, et qui n'a pour auditeurs que les oiseaux des bois ou les étoiles de la nuit, se livre longtemps à cette factice déclamation. Il suffisait, d'ailleurs, de donner à ces mêmes idées et à ces mêmes sentiments qui bouleversent inévitablement l'âme d'Arché, la forme de méditations ou de réflexions que l'auteur aurait pu traduire encore en une langue chaude et ardente.

Au surplus, M. de Gaspé a plus d'une fois imaginé des occasions très opportunes de s'abandonner au courant de sa passion oratoire. Il faut le louer de certaines pages éloquentes où son patriotisme s'est surtout éloquentement exprimé. S'il y a là quelques tirades où la rhétorique se complaît outre mesure, et quelques périodes, quelques phrases qui déroulent trop longuement leur traîne et s'y embarrassent, ces passages, tout pénétrés d'une émotion intense, ajoutent à la variété des récits, et remuent très agréablement l'âme du lecteur.

Chose étrange, d'ailleurs, cet auteur qui se moque si joliment des critiques, et qui entend bien n'écrire que pour exposer sans recherche une pensée sincère, ne dédaigne pas de montrer souvent qu'il a l'expérience des choses de l'art littéraire, qu'il a lu beaucoup et beaucoup appris, et qu'il trouve plaisir à faire l'étalage de ses souvenirs classiques. Non pas, certes, qu'il y ait chez lui du pédantisme—à moins qu'on puisse reprocher à l'auteur le défaut de l'un de ses personnages—mais il y a parfois, dans ce livre, une sorte de coquetterie qui sait être suffisamment discrète, qui surprend chez un écrivain aux allures si populaires, et qui apparaît ça et là, à travers les pages du roman, comme le sourire de l'aristocrate.

Aussi bien, comment M. de Gaspé aurait-il pu ne pas déverser en son livre le trop plein de ses souvenirs littéraires. La vie tranquille, isolée, quelque peu solitaire du manoir, après la catastrophe qui brisa sa carrière, lui fit des loisirs qu'il occupait à revoir ses auteurs, et à relire les livres de sa bibliothèque. Souvent le soir, au salon, quand la conversation menaçait de languir, il ouvrait Racine ou Molière, ou Shakespeare, ou reprenait un roman de Walter Scott, et il faisait lui-même la lecture à sa famille rassemblée. Parfois l'on montait des pièces, et l'on jouait Berquin ou les contes de Mille et une nuits, que venaient applaudir voisins, amis et censitaires. Il n'est donc pas étonnant que les réminiscences de l'étudiant se retrouvent si souvent sous la plume du vieillard, et qu'apparaissent dans les descriptions ou les discours de son livre la fable d'Hypolite traîné par ses chevaux, les nymphes, les naïades, la coupe du Léthé, et cette mythologie dont on fut si friand dans les collèges du dix-huitième siècle.

¹ Voir, à ce sujet, la *Biographie de M. de Gaspé*, par l'abbé Casgrain.

Ce sont encore sans doute ces mêmes circonstances d'une vie menée en pleine campagne, et en pleine nature, qui nous peuvent expliquer pourquoi l'auteur des *Anciens Canadiens* a parfois, et d'une façon si gracieuse, mêlée à ses récits et dialogues, la poésie des paysages. M. de Gaspé n'est pas précisément un descriptif; il n'est pas, à coup sûr, un ancêtre de Pierre Loti, ni non plus un imitateur assidu de Chateaubriand. Cependant, certaines pages qu'il a écrites et où il a mêlé son âme aux spectacles de la nature, font penser, quand on les lit, à l'auteur du *Génie du Christianisme* et des *Mémoires d'outre tombe*. Il y a dans telle description de l'incendie de la côte sud, et par exemple dans le tableau où l'on voit Arché contemplant, du haut d'un rocher, les ruines du manoir; il y a dans telles scènes qui se passent sur la grève ou dans les champs de Saint-Jean-Port-Joli, ou encore au bord de la rivière des Trois-Saumons, une grâce à la fois simple et ondoyante qui nous révèle chez l'écrivain une âme toute sensible à la poésie des choses. C'est parfois une toile assez large que peint M. de Gaspé, comme, par exemple, le décor de bois et de caps qui encadre le manoir seigneurial, ou les spectacles de notre grand fleuve quand il étale et fait miroiter sa splendeur aux feux du soleil couchant; parfois aussi, c'est un simple coup de pinceau, jeté en passant sur le fond mouvant du récit et de l'action, mais qui suffit à le colorer, à l'illuminer et à le transformer. Voyez, par exemple, comme il installe sous les sapins, les cèdres et les épinettes, pour le repas du midi, les habitants de Saint-Jean qui sont venus au village et à l'église passer la journée du vingt-quatre juin;¹ ou encore, assistez le soir, au pied d'un noyer et sous le rayon de lune qui se joue dans l'onde, à l'entretien si grave de Jules avec M. d'Egmont.²

C'est aussi ce sentiment délicat de la nature, et cette fraîcheur d'impression qu'elle lui donne, qui ont permis à M. de Gaspé de raconter la façon si piquante, si originale et si vraie les scènes de vie sauvage où se trouve un moment engagé le malheureux Arché. Il a surtout prêté aux acteurs de ce petit drame, et en particulier au chef indien, la Grand'-Loutre, le langage si imagé, si concret et si pittoresque qui convient. C'est la nature qui parle par ces voix de la forêt, et M. de Gaspé, habitué à l'entendre se révéler et chanter autour de lui, en a facilement rendu l'harmonieuse expression.

* * *

Il y a donc dans ce livre, qui n'a pas la prétention d'être une œuvre d'art, un art véritable qui s'ignore souvent, et qui s'affiche aussi parfois. Mais inconscient ou voulu, il intéresse, séduit, attache le lecteur. On feuillette et parcourt avec grande curiosité et avidité le livre des *Anciens Canadiens*; et, à se laisser prendre par cet enchantement

¹ Page 165.

² Page 146.

du vieux conteur, on constate une fois de plus comme il est possible que l'art véritable se moque parfois de l'art lui-même, tout comme l'éloquence vraie, selon le mot de Pascal, se moque de l'éloquence.

Le public de 1863 apprécia comme il devait l'œuvre qu'on lui présentait. Les deux mille exemplaires de la première édition furent rapidement enlevés, et dès 1864, on publiait une nouvelle édition de cinq mille exemplaires. Le livre a eu depuis trois autres éditions, et il est resté le roman le plus sympathique qu'il y ait dans notre littérature.

De Gaspé, qui avait si longtemps vécu dans la retraite et l'obscurité de son manoir, devint tout à coup l'un des plus illustres parmi nos écrivains. Son nom passa sur toutes les lèvres. Les étudiants, qui croyaient apercevoir dans le livre nouveau l'épopée populaire et nationale qui hante l'imagination de tout lecteur d'Homère et de Virgile, se disputaient le roman historique et merveilleux qui venait de paraître. Les élèves du Collège de l'Assomption préparèrent un triomphe à l'auteur des *Anciens Canadiens*. Au mois de juillet 1865, ils mirent à la scène un drame tiré de l'œuvre de M. de Gaspé. M. de Gaspé fut invité à cette fête littéraire, et y assista entouré de Maximilien Bibaud, du docteur Meilleur, et de représentants des familles de Salaberry, de Beaujeu, et de Martigny. Le supérieur du Collège, M. Barret, présenta à la jeunesse étudiante "cet homme qui l'avait devancée de trois quarts de siècle sur la route de la vie," et il le lui montra comme "l'expression vivante de l'antique noblesse de nos premières familles canadiennes."

M. de Gaspé, tout ému des honneurs qui couronnaient sa vieillesse—il avait alors soixante et dix-neuf ans—s'excusa de ne pouvoir que lire une courte réponse à tous ces hommages. "J'ai peu d'espoir, dit-il à ses jeunes admirateurs, de conserver longtemps le souvenir de votre gracieuseté: le septuagénaire ne vit que pour la tombe la plus prochaine. Mais quelque soit la durée de ma vie, elle aura l'effet de dissiper souvent les sombres nuages qui attristent, de temps à autre, l'existence d'un vieillard. Les jeunes messieurs qui ont si bien joué le drame dont le fond est tiré de mon ouvrage *Les Anciens Canadiens*, m'ont transporté aux beaux jours de ma jeunesse, et m'ont fait vivre pendant trois heures avec les amis que mon imagination avait créés."¹

Ces personnages qu'avait créés l'imagination de M. de Gaspé, avec lesquels il lui plaisait tant de s'entretenir, sont encore bien vivants, et ils réjouissent aujourd'hui et instruisent, comme il y a quarante ans, les jeunes gens et tous les lecteurs qui les veulent connaître. M. de Gaspé les a comparés, dans l'adieu qui termine son livre, à ces figures

¹ On peut consulter sur ce voyage de M. de Gaspé au Collège de l'Assomption, une petite brochure publiée à l'imprimerie de la *Minerve*, Montréal, 1865, et intitulée: *Biographie et oraison funèbre du Révd M. F. Labelle, et autres documents relatifs à sa mémoire ainsi qu'à la visite de Philippe Aubert de Gaspé, Ecr., au Collège de l'Assomption etc.*

fantastiques que le jeune fils de Jules, Arché d'Haberville, assis un soir au coin de la cheminée, voit se former, marcher, danser, monter, descendre, et puis disparaître dans la flamme mourante du brasier qui s'éteint. Il craint que tous ces personnages fictifs qu'il a fait s'agiter sous les yeux de ses contemporains ne disparaissent aussi, et bientôt, avec celui qui les faisait mouvoir. Cette crainte, qui est l'effet d'une extrême modestie, ne devait pas troubler l'artiste, ni la paix de ses soixante-quinze ans. Le roman de M. de Gaspé a survécu à son auteur; ou plutôt, il a fait que M. de Gaspé lui-même n'est pas mort tout entier. Avec les *Mémoires* qui en sont une suite et un complément, il porte et il portera longtemps encore à tous ceux qui parmi nous s'intéressent à la langue, à la littérature, à l'histoire et aux mœurs canadiennes le nom désormais impérissable de celui qui nous l'a donné comme le fruit savoureux de son aimable vieillesse.

VI.—*La République d'Indian Stream.*

Par M. F.-J. AUDET.

(Présenté par B. Sulte, et lu le 24 mai 1906.)

Tout le monde connaît le Val d'Andorre, cette minuscule république située sur le versant méridional des Pyrénées, entre la France dont elle reconnaît la suzeraineté, et l'Espagne dont elle relève au spirituel; se gouvernant elle-même au moyen d'un conseil élu annuellement. On pourrait faire plus d'un rapprochement entre ce petit état et celui qui fait le sujet du présent travail. Situés tous deux dans les montagnes, ils ont la même forme primitive de gouvernement et à peu près la même superficie; mais ils diffèrent essentiellement par leur origine. Tandis que le premier doit son indépendance à la générosité de Charlemagne, vainqueur des Maures d'Espagne, qui voulut ainsi reconnaître les services précieux que lui avait rendus un petit peuple de braves, l'autre naquit au sein des troubles causés par l'ignorance des diplomates anglais et la subtilité des hommes d'Etat américains qui rédigèrent le célèbre traité de paix de 1783. Mais, plus heureuse que sa sœur cadette d'Amérique, la république d'Andorre a pu passer à travers les obstacles accumulés sur sa route par le temps, les guerres et les révolutions européennes et conserver intacte son autonomie jusqu'à nos jours.

Les quelques notes que nous avons recueillies et rassemblées sur la république d'Indian Stream — qui n'a guère fait de bruit dans le monde, mais dont la courte histoire a été néanmoins assez mouvementée — suffiront, croyons-nous, quoique incomplète, pour donner une idée exacte de ce que furent son origine, son développement et sa fin. Elles nous montreront, une fois de plus, la coupable faiblesse dont a invariablement fait preuve le gouvernement britannique, chaque fois que les intérêts de notre pays se sont trouvés à traverser les desseins ambitieux de nos puissants voisins. En effet, le territoire et les intérêts du Canada commerciaux et autres, ont toujours été sacrifiés: témoin, le récent arrangement survenu entre la Grande-Bretagne et les Etats-Unis, au sujet des frontières de l'Alaska. Il faut espérer que le jour n'est pas trop éloigné où un homme d'Etat canadien réussira à obtenir de l'Angleterre le droit pour le Canada de faire ses propres traités.

D'où vient ce nom d'Indian Stream (Ruisseau des Sauvages) donné à cette partie du pays? L'histoire ne nous renseigne pas sur ce point; mais ce nom évoque tout un monde de suppositions. Cette contrée fut-elle jadis le théâtre des exploits sanglants de quelque farouche tribu,

ou, tout simplement un endroit de chasse et de pêche; un lieu de prédilection de pacifiques nemrods aborigènes, ou encore, un marché pour les fourrures précieuses? C'est ce que nous ne saurions dire.

La république d'Indian Stream, bornée au sud-est par la rivière Connecticut et le ruisseau dont elle portait le nom, et à l'ouest par le ruisseau de Hall, était située dans le comté actuel de Coos, état du New Hampshire, au nord de la ligne quarante-cinquième. Elle était entourée de nombreux petits ruisseaux, tributaires de la rivière Connecticut.

Durant plus d'un demi-siècle, ce petit établissement a joué un rôle assez important dans les négociations qui eurent lieu entre la Grande-Bretagne et les Etats-Unis au sujet des frontières entre le Canada et la république voisine. Il paraît cependant être resté inconnu à nos historiens.

Cette petite république doit-elle être regardée comme un état indépendant ou comme une simple municipalité? Cette question nous a été posée. Nous croyons pouvoir répondre que cette république était bel et bien un état indépendant exerçant les fonctions souveraines. Les actes des habitants de ce territoire ainsi que l'opinion du juge Fletcher nous semblent confirmer pleinement cet avancé.

Les habitants d'Indian Stream se considéraient en effet comme une nation neutre et se gouvernaient eux-mêmes. Leur gouvernement se composait d'un conseil de cinq membres élus annuellement.

Le traité de Versailles, du 3 septembre 1783, par lequel la Grande-Bretagne reconnut l'indépendance de ses anciennes colonies d'Amérique, devait délimiter les frontières entre la nouvelle république et ce qui restait des possessions britanniques sur ce continent. C'est ce qui fut fait. Mais le manque de connaissances exactes des lieux, ainsi que le peu de valeur que le gouvernement anglais d'alors semblait attacher aux colonies; tandis que les hommes d'Etat américains paraissaient au contraire, connaître les moindres détails de la géographie de ces lieux, et étaient possédés d'un âpre désir d'agrandir leur pays, furent la cause de beaucoup d'embarras; et l'Angleterre finit par faire perdre au Canada, une vaste portion de territoire qui alla augmenter la superficie déjà immense des Etats-Unis.

Dès 1763, le gouvernement impérial avait impolitiquement détaché de la province de Québec, pour les annexer à la province voisine de New York, de grandes étendues de terre qu'il se trouva à perdre lors de la reconnaissance de l'indépendance des Etats-Unis. Cette ligne de conduite avait sans doute été inspirée à l'Angleterre par le fait qu'elle ne se sentait guère sûre de conserver sa nouvelle acquisition, tandis qu'elle se trouvait bien chez elle à New York, et ne croyait pas en être délogée

si tôt. Mais nous savons que ses prévisions ne se réalisèrent pas. Au contraire, l'Angleterre perdit ses anciennes colonies et conserva le Canada, grâce à la loyauté et à la bravoure dont firent preuve ses nouveaux sujets, les Canadiens.

Voici en quels termes une partie de la frontière entre la province de Québec et les états du Maine, du New Hampshire, du Vermont et de New York fut décrite dans le traité de 1783 : "En suivant la hauteur des terres qui divisent les rivières qui se jettent dans le Saint-Laurent de celles qui tombent dans l'océan Atlantique, jusqu'aux sources les plus nord-ouest de la rivière Connecticut, puis en prenant par le milieu de cette rivière jusqu'à la ligne quarante-cinquième et suivant cette ligne vers l'ouest, etc." Cette description pouvait paraître assez explicite à quiconque ne connaissait pas le pays, mais en réalité, elle était on ne peut plus vague. Lequel des nombreux ruisseaux qui sillonnent cette partie du pays était réellement la rivière Connecticut ? Et, de toutes ces sources, ces lacs, ces marais, desquels viennent ces ruisseaux, lequel était véritablement la source la plus nord-ouest de cette rivière ? C'était là, on en conviendra volontiers, un problème difficile à résoudre pour les diplomates anglais qui ne connaissaient absolument rien de ce pays. Et, d'ailleurs, il s'agissait bien de cela ; le gouvernement britannique, qui venait de laisser glisser entre ses doigts la moitié d'un continent, devait-il daigner jeter un seul regard sur une si infime parcelle de ces "quelques arpents de neige" que lui avait si bénévolement cédés quelques années auparavant son cousin le roi de France ? Ne lui en resterait-il pas suffisamment ? Cela valait-il la peine d'occuper son attention, ne fût-ce qu'un moment ? Non, assurément. Cependant, ces questions d'un si mince intérêt pour l'Angleterre agitaient certains esprits au Canada, entre autres celui du juge John Fletcher de Sherbrooke, qui les posait, dans une lettre en date du mois d'avril 1835, à Lord Aylmer, alors gouverneur du Bas-Canada, et qu'il avouait ne pouvoir résoudre malgré sa profonde connaissance de cette région.

"Vous n'ignorez pas, écrivait-il, qu'il existe depuis plusieurs années, sur notre frontière sud-est, une espèce d'établissement extra-national, généralement connu sous le nom d'Indian Stream Settlement, lequel, comme beaucoup d'autres anomalies du même genre, est sorti des travaux des diplomates qui ont préparé le célèbre traité de paix avec les Etats-Unis en 1783. Je me rappelle avoir entendu parler de cette république, il y a bien des années, et depuis longtemps, je me proposais d'aller rendre visite à ses habitants, afin de me mettre au courant des choses et pouvoir ainsi mieux faire mon devoir quant à ce qui regarde cette partie du pays ; mais mes nombreuses occupations ici, m'ont empêché de mettre ce projet à exécution.

“ Il paraîtrait maintenant, continuait-il, que la prospérité croissante et la richesse de cette partie du pays ont depuis longtemps attiré l'attention du gouvernement de l'état voisin du New Hampshire. En conséquence, ils envoyèrent, il y a quelques années, un arpenteur afin de déterminer quel était le point le plus nord-ouest d'où coulait un ruisseau quelconque qui fut tributaire de la rivière Connecticut. Il ne pouvait, naturellement, pensait-il, avoir aucune difficulté à prouver à notre gouvernement que ce point devait être la source la plus nord-ouest de la rivière Connecticut; et qu'un ruisseau prenant sa source à ce point, quelque petit qu'il fut, ou quelque nom qu'il portât, fut réellement la rivière Connecticut elle-même, qui devait, d'après les termes mêmes du traité, constituer la frontière. Il paraîtrait que ce monsieur fut très heureux dans ses recherches; ayant trouvé qu'en admettant qu'une des sources d'un petit ruisseau qui se déverse dans la rivière Connecticut, fut réellement la source de cette dernière, ils pourraient ainsi agrandir considérablement l'état du New Hampshire aux dépens du Bas-Canada; et les autorités constituées ont institué des poursuites pour sédition et haute trahison contre certains habitants de la petite république pour avoir osé mettre en doute leur suprématie sur une grande portion de territoire qui avait, jusqu'à présent, été regardé *par erreur et ignorance*, comme faisant partie du Bas-Canada.

“ Un homme que je n'avais jamais vu ni connu, ajoutait M. Fletcher, mais qui me paraît avoir de bonnes manières et posséder une bonne dose d'intelligence, est venu me voir samedi dernier, en sa qualité de commissaire de l'Indian Stream Settlement, dont il est un des principaux fonctionnaires. L'objet de sa mission m'a paru être de demander ma protection et, par mon entremise, celle des gouvernements canadien et impérial, à propos de certaine invasion de leur territoire par le shérif du comté voisin de Coos, laquelle a eu lieu, paraît-il sous le prétexte d'exécuter certaines poursuites criminelles contre des délinquants qui refusaient de reconnaître la suprématie universelle des Etats-Unis; et cette invasion menace, si elle est renouvelée, d'être la cause d'une effusion de sang. La conséquence de cette mesure arbitraire a été que la grande majorité de ces républicains sont devenus de très dévoués et loyaux sujets de Sa Majesté britannique; et qu'ils sont maintenant tout à fait persuadés que la vraie rivière Connecticut est réellement celle dont il est fait mention dans le traité de Paris, et qu'ils devraient être désignés comme demeurant au nord de la frontière et du piquet de cèdre. Je lui ai répondu que je soumettrais le cas à votre Excellence....”

Je juge Fletcher transmettait en même temps, une pétition des habitants de ce territoire, dans laquelle ils exposaient leurs griefs, demandaient aide et protection, et reconnaissaient la juridiction du Bas-Canada.

Depuis longtemps le gouvernement de l'état du New Hampshire réclamait ce territoire comme sien, et M. G. Sullivan, procureur du comté de Coos, maintenait qu'il était sous la juridiction des cours de son comté et soutenait que les officiers de ces cours étaient justifiables d'y vouloir exercer leurs fonctions; d'un autre côté, le gouvernement du Bas-Canada le réclamait également et l'avait fait arpenter en 1792, sous la direction de Samuel Holland, arpenteur général de la province, qui l'avait inclus dans le canton de Drayton.

Dans un rapport en date du 9 mars 1793, Holland faisait observer au lieutenant-gouverneur, Alured Clarke, que l'idée de considérer le ruisseau de Hall comme frontière au lieu de la rivière Connecticut, lui paraissait être toute nouvelle; et que le New Hampshire n'y avait pensé que depuis peu, et il ajoutait: "La frontière entre le Bas-Canada et cette partie de l'ancienne province de New York appelée aujourd'hui Vermont, telle que tracée par les autorités des deux provinces durant les années 1772-73-74, traverse justement le ruisseau nommé *Hall's brook* et procède de là vers l'est jusqu'au bord du ruisseau, qui a toujours porté et porte encore le nom de rivière Connecticut. Cette rivière, d'après ce que j'ai toujours entendu dire et compris, disait-il, a toujours été considérée comme la frontière du New Hampshire."

Cependant, et c'était là une grande faute de la part du gouvernement du Bas-Canada; faute que les Américains ne manquèrent pas de faire tourner à leur profit plus tard, en réclamant possession actuelle de ce territoire; cependant, disons-nous, pour éviter les désagréments qui auraient pu résulter du fait de l'établissement de colons dans cette région, le gouvernement du Bas-Canada n'avait pas cru devoir y concéder de terrains. Il arriva donc ce qu'on aurait dû prévoir, c'est la population de ce territoire fut composée de *squatters*, c'est-à-dire de gens sans aveu, qui s'étaient établis là sans permission. Quelques-uns obtinrent, quelques années plus tard, des titres des autorités du New Hampshire.

La date exacte à laquelle les premiers colons vinrent se fixer dans cette région ne nous est pas connue, mais nous sommes porté à croire que ce dut être vers l'année 1792, c'est-à-dire, à l'époque où le gouvernement du Bas-Canada fit arpenter cette partie du pays. Depuis quelques années déjà, les loyalistes américains, chassés de leurs foyers par la révolution, affluaient dans les Cantons de l'Est, et les premiers habitants de cette région furent probablement de ces réfugiés politiques.

Ce petit coin de pays était bien arrosé et conséquemment très propre à la culture. De plus, n'étant soumis à aucune loi, il devint bientôt le lieu de refuge d'un groupe hétérogène qui s'y établit sans façons. Mais, la population augmentant, on s'aperçut bientôt que, quoique la liberté absolue soit une belle chose en théorie, il n'en fallait pas moins s'organiser et se donner une forme quelconque de gouvernement. On

nomma donc, comme nous l'avons vu, un conseil d'administration et l'on donna au nouvel état le nom pompeux d'Indian Stream Republic.

Les nouveaux citoyens se partagèrent la terre et se livrèrent à la culture. Ils devinrent bientôt assez nombreux. Au commencement de l'année 1835, l'établissement d'Indian Stream contenait soixante et neuf familles, composées de quatre cent quatorze habitants; et, il était très prospère. Chaque chef de famille possédait cent acres de terre et il y avait plus de quinze cents acres en culture.

Le pays se peuplait donc peu à peu, la forêt séculaire s'abattait sous la hache du défricheur; de riches moissons s'épanouissaient sous l'effort répété du colon, répandant partout le confort et le bien-être chez ces hardis pionniers de la civilisation, qui s'étaient aventurés dans cette région éloignée et privée de toute espèce de communications. Tout allait bien: c'était l'âge d'or. Mais, avant d'en arriver là, quel courage il leur avait fallu déployer! Quelle somme énorme de durs travaux n'avaient-ils pas dû exécuter! Ils avaient dû pénétrer à travers la forêt vierge; s'exposer au froid, à la faim, aux privations de toutes sortes, avec, pour toute richesse, une hache et quelques sacs de provisions qu'il leur avait fallu transporter à dos de longues distances. Quel rôle sublime, quoique effacé, que celui du colon, et pourtant combien peu apprécié!

La prospérité croissante du nouvel état excitait, depuis longtemps déjà, la convoitise des Américains, qui se décidèrent enfin à s'emparer de ce territoire. Or, qui veut la fin veut les moyens, dit-on, et les prétextes ne manquaient point.

Le 20 janvier 1835, William Smith, shérif adjoint du comté de Coos, non seulement y saisissait des effets appartenant à des habitants de l'endroit, mais il arrêtait même et emprisonnait à Lancaster, chef-lieu de son comté, un des résidents, Æneas Rowell, sur la plainte d'un nommé Luther Parker. Les habitants indignés de ce procédé arbitraire protestèrent hautement contre cet acte qu'ils regardaient avec raison, comme attentatoire à leur liberté et au privilège dont ils avaient joui jusque là de se gouverner eux-mêmes. Mais, se sentant impuissants en face de ce redoutable adversaire, ils se jetèrent dans les bras du gouvernement canadien—entre deux maux, ils choisisaient le moindre—et envoyèrent un de leur conseillers au juge Fletcher pour lui annoncer ce qui venait d'arriver et lui demander aide et protection contre les envahisseurs, comme il le dit dans sa lettre.

Parker étant venu peu de temps après en Canada, il fut arrêté, le 2 juillet et emprisonné à Sherbrooke, chef-lieu du district de Saint-François.

Les élections annuelles de la petite république avaient eu lieu comme à l'ordinaire, le 9 mars 1835. Voici les noms des conseillers

élus pour cette année: Richard J. Blanchard, Jeremiah Tabor, Burley Blood, Abner Hyland et William White.

La nouvelle administration s'adressa au juge Fletcher et lui demanda d'activer les négociations qui ne lui paraissaient avancer guère. Le temps paraît toujours long à qui attend dans l'anxiété.

Le 8 juin suivant, William Badger, gouverneur du New Hampshire, réclamait dans son message à la législature, le droit de cet état d'exercer juridiction sur toute l'étendue du territoire en dispute: "Premièrement parce que, disait-il, ce territoire est en deçà de la frontière fixée par le traité de 1783," et il citait à l'appui de ses prétentions, les mots mêmes du traité et référerait à certaines lettres patentes concédant des terres à différentes personnes; ainsi qu'à la proclamation du souverain anglais décrivant les frontières du Canada, après la cession, en 1763; "laquelle, ajoutait-il, nous donnerait même droit à plus que ce que nous demandons." "Deuxièmement, nous réclavons possession actuelle du territoire en question depuis 1783." Il essaie ensuite de démontrer quelle est la source la plus nord-ouest de la rivière Connecticut, en référant à un rapport d'une commission de la législature du New Hampshire, en date du 6 janvier 1790, laquelle avait été nommée pour délimiter la frontière entre cet état et le Bas-Canada. Il citait encore le fait qu'une résolution avait été passée par son gouvernement en 1820, autorisant le procureur général à instituer des poursuites contre toute personne qui s'établirait illégalement sur les terres de cet état, et qu'en conséquence de cette mesure, un résident du territoire en litige avait été ainsi poursuivi. Il mentionnait encore un autre rapport d'une commission de la législature, du mois de décembre 1824, se rapportant à ce sujet.

On voit que les autorités américaines s'étaient préparées de longue main au conflit qui devait inévitablement surgir un jour ou l'autre, entre les deux pays, au sujet de ce territoire; tandis que les gouvernements canadien et impérial semblaient plongés dans un profond sommeil, s'inquiétant peu ou point du lendemain.

Cependant, les événements se précipitaient et le gouvernement canadien dut bientôt sortir de sa léthargie. Le réveil fut brusque, le rêve fit place à la sombre réalité.

Le 12 octobre de cette année (1835), un nommé John H. Tyler, résident du canton Hereford, voisin de celui de Drayton, étant allé dans ce dernier canton, fut arrêté pour dette et on essaya de l'emmener prisonnier dans le New Hampshire, mais il s'échappa. Le juge de paix Alexander Rea, à qui Tyler avait porté plainte, émana un mandat d'arrêt contre ses assaillants: William Smith et John Milton Harvey, de Colebrook, N.H., et Richard J. Blanchard de Drayton. Zaccheus Clough, l'officier chargé d'exécuter ce mandat ayant, avec l'aide d'un

assistant, arrêté Blanchard le 22 du même mois, à Hereford, s'en revenait avec son prisonnier à la résidence de M. Rea, lorsque soudain, arrivé à quelques pas de son but, il fut attaqué par une dizaine d'individus armés, qui se jetèrent sur lui et sur son assistant, leur enlevèrent le prisonnier et se préparaient à l'emmener avec eux, lorsque M. Rea, attiré par le bruit et les cris, vint s'enquérir de la cause de ce tapage. Voyant ce qui se passait, il ordonna aux amis de Blanchard de lui remettre le prisonnier, puis de se disperser et de s'en retourner paisiblement chez eux. A ces mots, les bandits ne se possédant plus de rage, se ruèrent sur le magistrat, le terrassèrent, puis le jetant dans une voiture, ils l'emmènèrent à Canaan's Corner, dans l'état du Vermont, et ne le relâchèrent qu'au bout de quelques jours, après lui avoir fait subir toutes sortes de mauvais traitements. Durant la bagarre, un coup de feu à l'adresse de M. Rea, blessa un nommé Bernard Young à la cuisse. Ce dernier reçut aussi un coup de sabre en voulant défendre le magistrat.

L'offense était grave. On ne s'attaquait plus simplement aux habitants d'un territoire en litige; un magistrat dans l'exercice de ses fonctions avait été brutalement assailli et roué de coups, puis trainé en captivité dans un pays étranger. On avait même attenté à ses jours en déchargeant sur lui une arme à feu.

Le gouverneur, averti de la chose par MM. Moore et Gagy, députés du comté de Sherbrooke à l'Assemblée législative, s'émut et nomma immédiatement une commission d'enquête. Les commissaires se mirent tout de suite à la besogne et firent rapport en janvier 1836; ils constatèrent que les plaintes qui avaient été portées par les deux membres ci-haut nommés étaient bien fondées.

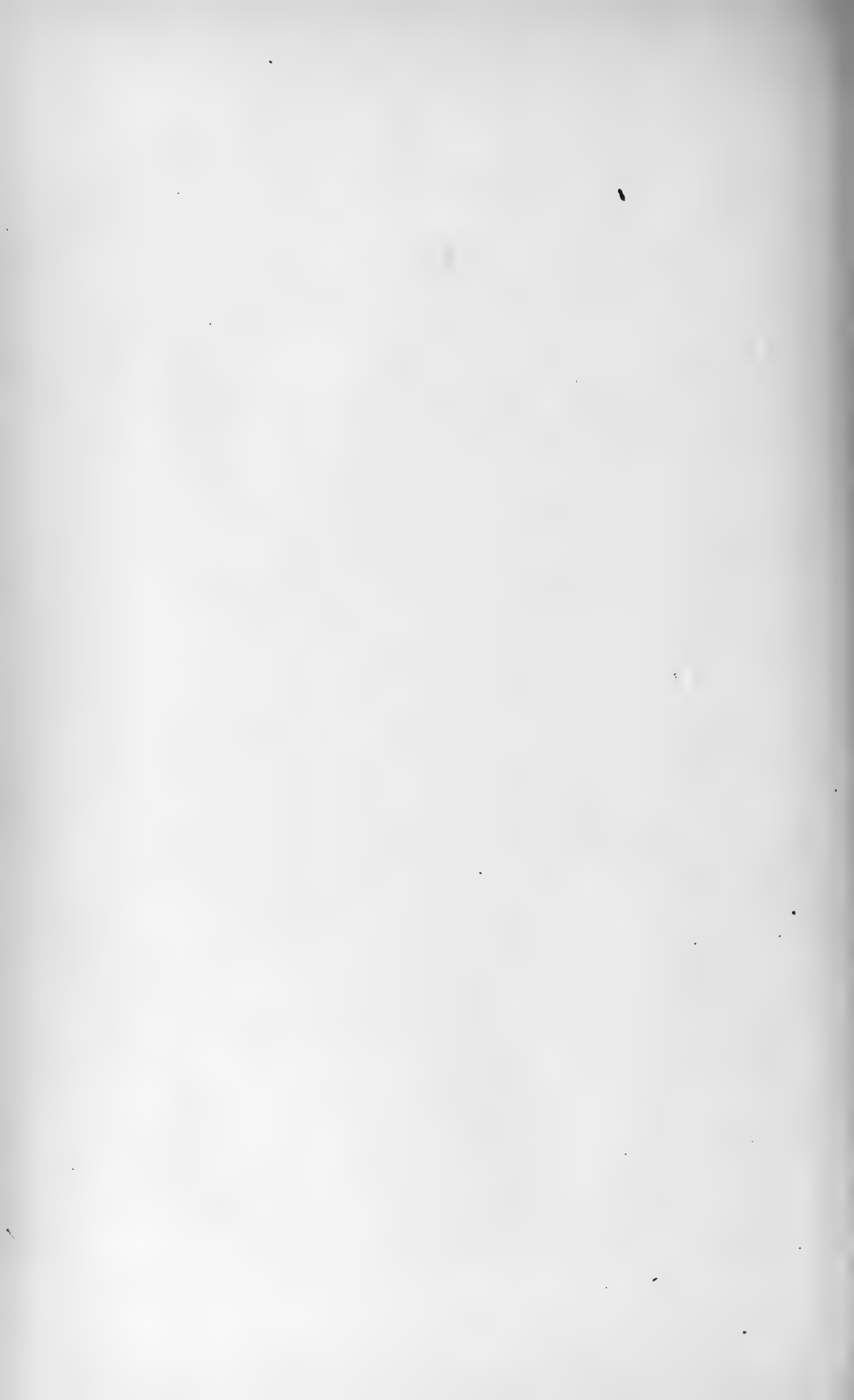
De nombreux échanges de correspondances et de documents eurent lieu entre les gouvernements du Bas-Canada et du New Hampshire, mais cela n'ayant abouti à rien, la question fut enfin soumise par Lord Aylmer ambassadeur, des réclamations au gouvernement central à Washington. aux autorités impériales qui adressèrent, par l'entremise de leur ambassadeur, des réclamations au gouvernement central à Washington.

Cependant, ces pourparlers traînaient en longueur et rien ne se décidait. Les habitants d'Indian Stream, toujours menacés par les autorités du New Hampshire, et en butte aux incessantes tracasseries des fonctionnaires du comté de Coos, ne se voyant pas secourus par le gouvernement anglais, finirent par perdre courage. Les uns quittèrent cette région devenue si inhospitalière, les autres décidèrent, pour éviter une plus grande effusion de sang, de reporter leur dévouement et leur loyauté à la république américaine, et le 5 août, ils annonçaient au juge Fletcher qu'ils reconnaissaient désormais la juridiction du New Hampshire.

Le gouvernement britannique abandonna définitivement ses droits à ce territoire par le traité Ashburton, signé à Washington, le 9 août 1842.

“ Par ce traité, dit M. Louis P. Turcotte, dans son *Histoire du Canada sous l'Union*, l'Angleterre cédait des millions d'acres de terre qui appartenaient incontestablement au Canada et au Nouveau-Brunswick. Elle abandonnait dans la vallée de la Madawaska, plus de deux mille Canadiens-français et Acadiens, qui auraient préféré continuer vivre sous la constitution anglaise.”

. APPENDICE



REGLEMENTS

DE LA

SOCIÉTÉ ROYALE DU CANADA

1. *But de la Société.*

Le but de la société est expliqué comme suit dans son acte d'incorporations: "1o encourager les études et recherches littéraires et scientifiques; 2o publier des bulletins annuels, ou semi-annuels, contenant les extraits des procès-verbaux de ses réunions, les relations des travaux accomplis, ainsi que les études et mémoires de mérite, et autres documents qui pourront être jugés dignes de publication; 3o offrir des récompenses ou prix pour des études ou écrits sur des sujets se rattachant au Canada, et aider les recherches déjà commencées et poursuivies au point qu'elles auront plus tard une valeur probable; 4o aider à la collection de spécimens dans le but de former un musée canadien d'archives, d'ethnologie, d'archéologie et d'histoire naturelle."

2. *Le nom.*

Avec la gracieuse permission de Sa Majesté la reine Victoria, la société porte le nom de "Société Royale du Canada" et ses membres sont désignés comme "Membres de la Société Royale du Canada."

3. *Président honoraire et patron.*

Son Excellence le gouverneur général est président honoraire et patron de la Société.

4. *Divisions par sections (telles que définies en 1905).*

La Société se compose de quatre sections:—

1. Littérature française, Histoire, Archéologie et sujets conjoints.
2. Littérature anglaise, Histoire, Archéologie et sujets conjoints.
3. Science des Mathématiques, de la Chimie et de la Physique.
4. Sciences Géologiques et Biologiques.

Les sections peuvent s'assembler séparément pour l'examen et la discussion des études soumises, de même que pour les affaires, à tels temps et lieu fixés par elles, sous le contrôle du conseil.

Dans l'intervalle des réunions, les papiers qui doivent paraître sans retard, peuvent être soumis à l'une ou l'autre section et discutés par correspondance entre les membres de la section intéressée, de la manière et sous les conditions ci-après indiquées.

5. *Officiers.*

Les officiers de la Société sont un président, un vice-président, un secrétaire honoraire et un trésorier, élus par la société réunie. Chaque section élit son président, vice-président et secrétaire. Les élections sont annuelles.

Le Conseil de la Société se compose des officiers ainsi élus et des ex-présidents, durant trois années, à partir de la date de leur sortie de la présidence; en outre, tels anciens membres du Conseil, ne dépassant pas le nombre de quatre, choisis par le Conseil même. Les anciens membres ainsi nommés, restent en fonctions durant trois années et ensuite jusqu'à ce qu'on les remplace.

6. *Les Membres (article modifié en 1899 et 1900).*

Les membres doivent résider en Canada ou à Terre-Neuve; il faut qu'ils aient publié des ouvrages originaux ou des mémoires de valeur ou qu'ils aient rendu des services éminents à la littérature ou aux sciences.

Le nombre des membres de chaque section est, en général, limité à vingt-cinq mais peut aller jusqu'à trente, selon le désir de la section et d'après la manière indiquée ci-après. Les candidatures pour remplir les sièges vides sont reçues en tout temps par écrit signé de trois membres de la section et ces papiers sont à la garde du secrétaire honoraire qui en tient record. Lorsqu'il se déclare une vacance, le secrétaire honoraire en donne avis aux membres de la section et transmet à chacun d'eux une liste imprimée des candidats qui sont sur les rangs, et ce le quinze du mois de mars précédant la réunion annuelle ou assemblée générale de la Société. Chaque membre place une croix vis-à-vis le nom du candidat de son choix et renvoie le papier au secrétaire honoraire, qui en fait rapport au Conseil avant la réunion générale annuelle de la Société. Le Conseil soumet à la Société le nom du candidat qui a obtenu la majorité de la section. S'il n'y a pas de majorité, le Conseil peut choisir parmi les candidats celui ou ceux qui ont le plus de votes en leur faveur et en donner avis aux membres de la section, au moins un mois avant la réunion annuelle où les élections peuvent avoir lieu en prenant le vote des membres présents, sinon, le sujet est référé de nouveau à la section intéressée pour choisir parmi les candidats en nomination, afin de recommander ceux-ci à la Société, qui fait l'élection. La section doit soumettre ce choix le premier jour de l'assemblée annuelle, à 2 hrs 30 p.m., s'il n'est pas ordonné autrement par la Société. S'il y a plus d'une vacance chacune doit être traitée séparément.

Chaque section a le pouvoir d'augmenter le nombre de ses membres par un ou deux annuellement. La nomination de ces candidats se fait

de la manière ordinaire, mais chaque membre de la section a la faculté de voter absolument contre l'élection d'un membre additionnel; et si la majorité des voix se trouve opposée à l'élection additionnelle, telle élection n'aura pas lieu cette année. Le présent article cessera d'avoir son effet dès que le nombre des membres d'aucune section sera de trente.

7. *Devoirs des Membres.*

Les membres doivent signer les règlements de la Société, doivent être présentés par le président à la Société en séance générale; doivent assister aux réunions générales ou faire connaître le motif de leur absence au secrétaire honoraire; doivent payer une contribution annuelle de \$2, ou la somme de \$20 en un seul paiement pour toute la vie. Ces contributions donnent droit à un exemplaire du bulletin annuel de la Société.

Tout membre peut se retirer de la Société. Sur la recommandation du Conseil, et par une résolution de la Société en session générale, un membre qui se retire peut être placé sur la liste des retraités conservant leur titre de membre.

Tout membre qui sera trois ans consécutifs absent des assemblées et sans présenter de travail, ni donner par écrit des raisons satisfaisantes à la Société, sera considéré comme démissionnaire.

8. *Membres correspondants.*

La Société peut élire au scrutin, sur la proposition de trois membres, ou sur la recommandation du Conseil, des membres correspondants qui ne résident point en Canada. Ces personnes doivent avoir acquis une éminence en littérature ou en science et ceci doit être démontré à la Société au moment de la recommandation. Le nombre des membres correspondants est limité à seize.

Sous cette règle 8, il a été décidé, en mai 1884, que chaque section aura quatre membres correspondants, et que leurs noms, les noms de ceux qui les proposent, et les raisons données par écrit, seront portés à la connaissance de la Société par l'entremise du secrétaire honoraire, au moins une journée avant le scrutin pour l'élection de chaque membre correspondant.

9. *Assemblées.*

La Société tient une assemblée annuelle dans une ville du Canada choisie de temps à autre pour cet objet. A l'une de ces assemblées on peut décider de tenir d'autres réunions dans le cours de l'année. L'assemblée annuelle a lieu selon la date fixée par l'assemblée précédente et, à son défaut, le Conseil détermine cette date. Les bureaux de la Société

seront à Ottawa, et ses assemblées auront lieu dans cette ville, à moins de décision contraire.

10. *Ouvrages présentés (article modifié en 1905).*

I.—Le titre de tout manuscrit, mémoire ou travail quelconque qu'un membre se propose de lire à une réunion de la Société, doit être soumis, avec un résumé de son contenu, au Conseil, par le moyen du secrétaire honoraire, avant l'assemblée en question. Ceci étant fait et approuvé, la communication dont il s'agit est référée à la section dont elle ressort, où elle est lue et discutée, soumise à un comité de la même section et, sur rapport de ce comité, elle peut être recommandée au Conseil pour publication, soit dans son entier ou par extraits, dans les bulletins de la Société.

II.—Le titre de tout manuscrit, mémoire ou travail quelconque qu'un membre se propose de discuter par voie de correspondance, avec un résumé de son contenu, peut, sous l'article 4, être renvoyé au secrétaire de la section à laquelle il appartient, en aucun temps entre deux assemblées. Si le secrétaire de la section (se faisant assister s'il le désire) décide que la publication immédiate est chose importante, et si la section a assez de fonds disponibles pour cet objet, le manuscrit au complet, dès qu'il est reçu, doit être composé par les typographes de la Société, avec la date de sa réception très visiblement indiquée; et un exemplaire ainsi imprimé est envoyé à chaque membre de la section.

Un certain nombre d'exemplaires sont donnés à l'auteur. Tous ces papiers sont publiés sous la forme et le titre déterminés par le Conseil, avec un en-tête expliquant qu'ils sont soumis à la discussion des membres de la section, sujet à revision, et que la Société n'est pas responsable de leur contenu.

La somme d'argent accordée à une section pour cet objet est fixée, de temps à autre, par le Conseil.

Les papiers ainsi référés à une section pour être discutés par correspondance seront, lors de la prochaine assemblée annuelle, soumis de nouveau à la section pour plus ample discussion, si on le désire, et ils sont traités d'après la procédure (article I.) nécessaire avant que d'être insérés dans le bulletin.

III.—Les écrits des personnes qui ne sont pas membres de la Société peuvent être soumis par les membres sous les mêmes conditions que pour leurs propres ouvrages.

11. *Sociétés associées.*

Toute société littéraire ou scientifique du Canada choisie par un vote de la Société, est invitée au moyen d'une circulaire du secrétaire

honoraire à désigner annuellement, un de ses membres comme délégué à la réunion de la Société et ce délégué, durant son terme comme tel, a le privilège de prendre part aux séances générales ou celles des sections, pour lire et discuter des travaux; et il doit pouvoir fournir un court aperçu des ouvrages accomplis et des études publiées durant l'année par sa société; aussi faire rapport sur toute matière où la Société Royale peut être utile par ses publications ou autrement.

12. *Circulation du Bulletin.*

Des exemplaires du bulletin de la Société sont distribués comme suit:—

A tout membre qui a payé sa contribution.

A toute société associée.

Telles sociétés étrangères choisies par le Conseil.

Les lieutenants-gouverneurs des provinces du Canada et celui de Terre-Neuve.

Les membres du Conseil Privé du Canada.

Le juge en chef et les juges du la Cour Suprême du Canada.

Les présidents du Sénat et de la Chambre des Communes.

Le juge en chef de chaque province.

Le premier ministre de chaque province.

Le président de la législature de chaque province.

Le ministre ou le surintendant de l'instruction publique de chaque province.

Les universités, la bibliothèque du parlement et les bibliothèques des législatures provinciales.

13. *Devoirs du Conseil.*

Le Conseil administre toutes les affaires de la Société dans l'intervalle des assemblées et fait les arrangements nécessaires pour ces assemblées. Il s'assemble sur convocation du président. Trois membres forment quorum.

Le Conseil soumet un rapport de ses actes à chaque réunion de la Société pour son approbation.

Le Conseil a la garde et l'administration de tout argent, contributions et autres propriétés de la Société, sujet à la sanction de ses actes, comme il est dit ci-dessus.

En l'absence du président et du vice-président, le Conseil peut nommer un président temporaire et, dans le cas où la charge de secrétaire honoraire ou celle du trésorier deviendrait vacante, il peut nommer un secrétaire ou un trésorier en attendant la prochaine réunion de la Société.

14. *Devoirs du Secrétaire honoraire.*

Le secrétaire honoraire tient les registres de la Société et du Conseil et conduit leur correspondance; il reçoit et enregistre les nominations de membres et officiers des sections; est gardien des listes et minutes de la Société, et, avec l'avis du président, doit s'occuper de toute affaire qui survient dans l'intervalle des sessions. Il peut, avec le consentement du Conseil, déléguer aucune partie de ses devoirs à un assistant payé et nommé par le Conseil.

15. *Devoirs du trésorier.*

Le trésorier a la garde de l'argent de la Société, en tient compte et soumet le tout au Conseil lors de ses réunions; il reçoit les souscriptions, les dons et cadeaux et fait les déboursés autorisés par le Conseil.

16. *Adresses et rapports spéciaux.*

Il est du devoir du président et, s'il en est empêché, du vice-président, de préparer une adresse pour chaque assemblée annuelle.

Il est du devoir du président de chaque section et, s'il en est empêché, du vice-président, de préparer une adresse traitant de ce qui concerne spécialement sa section pour chaque assemblée annuelle.

La Société en session générale, ou toute section, du consentement de la Société, peut nommer des comités pour préparer des rapports sur aucun sujet spécial de littérature ou de science, ou sur les progrès de la littérature et des sciences, ou sur des ouvrages publiés en Canada, et proposer les mentions d'honneur qui paraissent désirables dans le cas d'ouvrages de mérite ou de recherches dignes d'attention.

17. *Lecture des travaux.*

I.—Les représentants de chaque section dans le Conseil sont juges des travaux qui doivent être acceptés ou refusés. Aucun travail n'est lu dans les sections, à l'assemblée générale, à moins qu'il n'ait été présenté, soit dans son entier, soit par extraits, avant les dernières trois semaines et régulièrement accepté par le Conseil, selon l'article 10 de ce règlement, autrement il faut la permission spéciale du Conseil. La publication d'aucun papier non reçu de cette manière après lecture ou présentation à la Société, peut être refusée par celle-ci.

II.—Aucun papier déjà publié n'est accepté par la Société, sauf dans les cas où il aurait été entièrement refondu.

III.—Un programme renfermant les titres des papiers qui seront lus est imprimé et envoyé à tous les membres de la Société au moins une semaine avant la session.

IV.—Il est du devoir du secrétaire de chaque section de préparer avant chaque jour de la session une liste des papiers qui seront présentés à la section, avec les noms des auteurs et le temps requis pour leur lecture. Ces listes sont imprimées et rendues publiques chaque matin avant l'heure fixée pour la réunion.

18. *Publication des travaux.*

I.—L'auteur doit revoir son manuscrit après la lecture, pour l'envoyer à l'imprimeur.

II.—La première épreuve en galée est envoyée à l'auteur, aussi une revise en galée.

III.—La matière est alors mise en page et une épreuve envoyée au secrétaire de la section à laquelle l'ouvrage appartient, et il signe cette épreuve après l'avoir corrigée. Si l'auteur le demande, il peut voir l'épreuve mise en page.

IV.—Le président du comité d'impression, ou son remplaçant, signe le bon à tirer. Il voit à l'uniformité des en-têtes et du caractère employé.

V.—Si les auteurs doivent s'absenter pour aller dans des lieux tels qu'il résultera des délais de leur éloignement, il doivent désigner la personne qui lira leurs épreuves, sans quoi le secrétaire de la section sera responsable de cette lecture et des corrections.

VI.—Si, par suite de l'absence de l'auteur, l'épreuve n'est pas lue par lui, et s'il n'a nommé personne comme substitut, et si le secrétaire refuse de la lire, le comité d'impression ne retardera pas la publication du volume jusqu'au retour de l'auteur, mais laissera le papier de côté.

VII.—Toute pièce en langue française sera lue, pour les fins purement littéraires, par un correcteur d'épreuve expérimenté et familier avec l'usage actuel de la langue en France.

19. *Amendements à la constitution et aux règlements (adoptés en 1893).*

Les membres qui ont des motions à proposer pour changement à la constitution ou aux règlements de la Société, doivent en donner avis un mois avant l'assemblée générale, et le secrétaire prépare une liste imprimée de tels avis pour la soumettre aux membres le premier jour de la session.

Aucune règle ni règlement de la Société ne doit être suspendu sans le consentement des deux tiers des membres présents à l'assemblée.

ROYAL SOCIETY OF CANADA

TRANSACTIONS

SECTION II.

ENGLISH HISTORY, LITERATURE, ARCHÆOLOGY, ETC.

PAPERS FOR 1906

I.—*Additions and Corrections to Monographs on the Place-nomenclature,
Cartography, Historic Sites, Boundaries and Settlement-
origins of the Province of New Brunswick.*

(Contributions to the History of New Brunswick, No. 7.)

BY W. F. GANONG, M.A., PH.D.

(Communicated by Dr. S. E. Dawson.)

I.—Additions and Corrections to the Plan for a General History of New Brunswick.

II.—Additions and Corrections to the Monograph on Place-nomenclature.

III.—Additions and Corrections to the Monograph on Cartography.

IV.—Additions and Corrections to the Monograph on Historic Sites.

V.—Additions and Corrections to the Monograph on Evolution of Boundaries.

VI.—Additions and Corrections to the Monograph on Settlement-Origins.

Title-page and Contents to the series.

The five monographs of this series were designed to cover the historical geography of New Brunswick, and in plan at least they do so. The organization given the respective subjects by their publication has had the result not only of directing my own studies further, but also of bringing much additional information from correspondents. Thus a large amount of new material and some corrections have come into my hands, and it is the object of this work to present them, and in such a way that all items may be referred to their proper places in the respective monographs. A title-page, preface and table of contents to the entire series is added at the end of this paper.

*Place-nomenclature.*1. ADDITIONS AND CORRECTIONS TO THE PLAN FOR A
GENERAL HISTORY OF NEW BRUNSWICK.

To this first paper of the series I have little here to add. I would call the third period of our history The Acadian (rather than the French) Period. I have been unjust in my comments (on page 98) upon existent works dealing with New Brunswick Indians, which I meant to describe as inadequate. And I hope now to carry out in full the plan outlined in this paper.

II. ADDITIONS AND CORRECTIONS TO THE MONOGRAPH
ON PLACE-NOMENCLATURE.

The figures prefixed refer in all cases to the pages of the original monograph.

181. The discussion of the methods or origin of place-names, on this page, is incomplete. A fuller list of methods is given by Johnson in his article on place names in Canada, in "Canada, an Encyclopedia," 1897, Vol. I. A thorough study of the origin of place-names is a study in psychological philology, a subject which will receive more study in the future than it does at present.

In general it may be said that place-names originate in one or the other of four somewhat distinct ways. First, they are *repetitive* of earlier or aboriginal names, adopted for convenience usually without question of their significance. Second, they are *descriptive*, either of a physical peculiarity, of resemblance to a familiar object, of geographical location, of an associated person or event, or of ownership. To this class belong the great majority of place-names, including practically all those of aboriginal or unlettered peoples, as will be found illustrated later, under page 211. They are never given deliberately, but arise as descriptive phrases, which by repetition become transformed into proper names. Third, they are *commemorative* and deliberately chosen to honour some person (saint, king, patron, official), or to recall some place. Such names never arise naturally, but are given by persons in authority, explorers, rulers or legislators, and are more frequently applied to artificial than to natural geographical features or divisions. Fourth, they are *associative*, or suggestive of some fanciful or sentimental feeling, legend, or idea, or of good omen. Found to a slight extent among the names given by simple peoples, they reach their highest development where there is a deliberate striving for effect in names, as at pleasure resorts.

Place-nomenclature.

A striking fact about most commemorative names is their failure to commemorate. Innumerable names are given, especially in new countries like New Brunswick, to honour some individual. The great majority of our parish names have thus originated. But almost invariably no record is made of the reason for the name, its origin is speedily forgotten, it is used by millions of people with no thought of its significance, and it is only finally by the laborious search of some antiquarian that its significance becomes known to him and his little circle of fellow students.

184. Of changes in place-names caused by mis-prints on maps we have several in New Brunswick. Thus, the name *Mascabin Point* (in Charlotte) is, I have no doubt, simply a misprint for *Mascarin* (a form for *Mascareen*) Point; the new form is not known locally except that, being on the charts, it is known to some captains in that vicinity. Again, a branch of the Little South-West Miramichi is called on some maps *Mainor Lake Brook*; but I find by comparison with the originals in the Crown Land Office that this should read *Main* or *Lake, Brook* being named for a lumberman, one *Main*. But a very striking case occurs in the the name *Upsalquitch*. This form, though universal on maps and in such literature of the region as exists, is not used locally, for the river is called by guides, lumberman and others who use it *Absetquetch* or some similar form of this word. I find, as I have shown in the Bulletin of the Natural History Society of N. B., V. 180, that the word was written *Upsatquitch* on Van Veldens's original survey map of the river, but was copied with a misprint of *l* for *t*, giving us the present form *Upsalquitch* upon Purdy's printed map of 1814, which has been followed by all others down to the present day, thus establishing a literary as distinct from a local form. Again the map-name *Belas Basin*, at Lepreau, has no doubt been formed, as later noted, by an accidental map-combination of two separate words.

The persistence of these forms by the way, shows the great effect of publication in giving stability to place names, and another illustration of the same principle is seen in the survival of *St. John* and *St. Croix*, much-printed names in early times, which are among the few European names which have been able to displace the native names on our rivers. All humanity has a reverence for that which is in print and attributes to a printed statement an authority it only rarely merits.

185. Another danger to be guarded against in seeking the origin of place-names, is the acceptance of a folk-etymology, based upon the accidental resemblance of the name to some striking word or phrase. Such explanations are of all degrees from plausible to absurd, and a

Place-nomenclature.

great many of them are current in New Brunswick. Thus, to take those of most dignity, *Shepody* is locally believed to be derived from Chapeau Dieu, God's hat, in allusion to Shepody mountain. *Tetagouche* is supposed to be corruption of Tête-à-gauche, explained by a story to the effect that its first explorers found it heading unexpectedly "to the left" as they ascended it. Yet we know that both of these words are of Indian origin. Again *Tormentine* is said locally to be named for the torments suffered through mosquitoes, etc., by its first settlers, and *Midgie* similarly for torments of midgets. Again, *Pointe de Bute* is locally said to be altered from Point of Boat, name of a ferry once there. Yet we know the origins of these words were very different. Again, it is sometimes thought, (especially by those who have come to know that place-names undergo much change) that some names of very obvious origin have arisen in some more complex manner. Thus Devil's Head on the St. Croix (in Maine) is locally explained by some as rightly Duval's Head, from a former resident, and by others as D'orville's Head (for a companion of Champlain). Yet there is every evidence that it really originated in its present form. Of a somewhat different nature are the origins attributed to Indian and other strange names. Thus, I have seen *Quaco* explained in a newspaper as from a phrase uttered in irritation by an Indian maiden disturbed by the noise of wild ducks, "hush, don't quack so"; two or three correspondents write me that *Portobello* is locally explained as the result of the loud halloing of a man named Porter when lost in the woods, as reported by an Indian who said "Porter Bellow"; another correspondent tells me *Nauwigewauk* is locally explained as the expression of an Indian whose wearied squaw had been allowed to rest there for a time,—“now would ye walk”; *Kennebecasis* is often explained, even in print, as result of the expression of two travellers lost on the river in a snowstorm, who saw a tavern on the bank, which they thought they knew, and one asked the other, "Can it be Cases?" Again *Tryon Settlement*, in Charlotte, is stated to have been named when it was new by a traveller who approached it at night and asked for lodging, and was told to "try on," and received the same reply at each. And there are, no doubt, many others. Yet in most, if not all, these cases, we know the true origin, which is very different.¹ Originally, no doubt,

¹ In the same spirit, though in different form is the "legend" of the origin of the name *Tobique*, locally explained as extended from Tobique Rocks (below the mouth of that river), which name, in turn, arose thus: an Indian and the Devil were throwing these rocks to see which could throw the farthest, and the Indian in his ardour having stepped over the proper mark, the Devil exclaimed, "toe-back."

these explanations were given in jest, and are so repeated by the more intelligent residents, but by others they are half, and by many wholly, believed. Man has some little desire for explanations of odd things, but only to such an extent that any plausible explanation is sufficient. It is but rarely that the desire is strong enough to seek not only an explanation but proof of its correctness, a psychological peculiarity by no means confined to matters of place-nomenclature.

A very interesting case of the origination of a place-name, all stages of which have fallen within my own knowledge is *De Monts*, on the St. Croix, as recorded in these Transactions, VIII, 1902, ii, 145.

186. In the investigation of the origin of place-names one must be constantly on guard against deceptive coincidences, the more especially as it is through coincidences only that many origins are elucidated. Several misleading coincidences occur in New Brunswick, and the student, did he not know from other evidence the true origin, would naturally be led to a wrong conclusion. Thus on the Tobique is an important mountain called *Blue Mountain*, and just below it lives a family named Blue: did we not know that the former name was given long before the settlement of the river (it is on a map of 1830), we would infer that the mountain took its name from this family of near-by residents. Again, there is in Queens County (the south-western corner) a *Queen's Brook*, which we would infer was named from the country; but we know that it is named from one Queen or Quinn through whose land it runs. Again, Hempstead is known to have been named by Loyalists for Hempstead, Long Island, N.Y.; opposite is a *Long Island* which has been supposed to have been so named for Long Island, N. Y.; yet the records show that this island bore that name twenty years before the Revolution closed. Again, one Burt had a grant in the parish of *Burton* in 1785, and we might infer that the parish was named for him, did we not know that it was named much earlier for another man. Again, the leading family which settled *Cocagne* was named Gueguen, a name having many variants such as Gogain, etc.; the latter form comes close to Cocain, one of the variants of Cocagne, and did we not know that Cocagne was given by Denys in 1672, we would naturally infer that it was derived from this leading family of earliest settlers. Again, in Prince William Parish, settled by the King's American Dragoons, is a *Lake George*; it is a natural inference that this name was given in honour of King George III, yet we have perfect evidence that it was named for an early resident. *Bonny River*, would naturally be taken as a name descriptive of an attractive stream, but we know it is named for a resident.

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187. To the list of Indian names in actual use should be added, in Maliseet Territoriality, *Pekonk Hill*, *Nalleguagus Rapid*, *Slugundy Rapids*, while *Tanty-Wanty* and *Poodiac* are imported. In Passamaquoddy territory, *Kilmaquac*, *Ponwauk*, *Slugundy* and *Wauklehegan*. In Micmac Territory *Allabanket*, *Guagus*, *Cowassiget*, *Pisiguit*, *Malpec*, *Onlockywicket*, *Bittabock*, *Kewadu*, probably *Monash* and *Paunchy* and possibly *Sheephouse* and the hybrid, *Long Lookum*, while *Antinouri*, *Sabbies* and *Waugh* are to be removed from the list. *Pascobac* and *Medisco* persist as the names of school districts.

189. To the list of rivers named for Indian chiefs or hunters should be added probably *Calamingo*, *Pemwit*, *Nicholas*, *Grand John*, *La Coote* and *Jacques*, or *Jacquo*, an old name of the Aroostook.

197. Add to the list of names of the French period, *Enaud Point*, *HaHa River*, *Terreo Lake*, *Ruisseau la Chaloupe*, *Ruisseau des Malcontents*, *Savage Island*, *Roshea*, probably *St. Tooley*, and no doubt many other French names, though no record is extant of such early use.

200. Add to the list of names of the New England Period, *Marsh Creek*, *Middle Island*, *Burpees Brook*, *Mosquito Cove*, *Darlings Island*, *Kilmarnock Head*, *Crockers Island*, *Crooked Creek*, *Black Brook*.

207. The account of the nomenclature here given is entirely superseded by the reference given later under *Mahood Lakes* and *Inglewood*.

209. The list of topographical terms here given is superseded by a later and better published in the *Educational Review* XIII, 146. Following are the more important additions to the latter list, excluding Acadian terms which I hope to treat separately;

Arm.—Used on Grand Lake for its branches “Northwest arm,” etc.

Beach.—Used along the North Shore not in the usual sense, but for the long sandy islands and peninsulas of sand so prevalent in that region.

Bluff.—Used in Kings County for a bare rocky cliff.

Foot.—For the lower end of a lake.

Hollow.—Name in Kings and Albert for a deep narrow winding ravine or gorge, having at spring and fall a rapid stream.

Jam.—Where natural jams of logs occur and become permanent it becomes a topographical term.

Middle Ground.—A part of a bar usually higher than either end.

Mistake.—A cul de sac with a wide and inviting opening.

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Lead.—Occurs in Queens County for a narrow winding stream between lakes.

Midland.—The high land between two valleys; has become the name of more than one settlement.

Lagoon.—This name on the north shore is purely a map name, never used by the residents, who use the name bay.

Pot-holes.—Applied often to the glacial sink-holes; and also to the wells in rocks under falls.

Rapids.—Used in Gloucester County to distinguish the swift fresh-water part of a river from the *Tideway*.

Slide.—An inclined place or slope of loose rock occurring in a gap in a cliff.

Sluice.—Used on the Nepisiguit for narrow rapids.

Queue, (French, a tail).—Name for a little bay at the end of a lake; used twice on Miscou Island.

Tideway.—Used now in Gloucester County for the tidal part of a river, in contradistinction to *Rapids*; also in *Cooney*, 176.

Turns.—Used in several places for abrupt bends in rivers.

Works.—A place in the woods where lumbering has been done; also used for beaver workings; in old reports for the arrangements for catching eels,—“eel-works.”

209. Another series of Indian, with some French, names, has recently (1903) come into use, viz:—the names of the following stations between St. John and Welsford, on the Canadian Pacific,—*Acamac*, *Ketepec*, *Martinon*, *Ononette*, *Pamdenec*, *Woolastook*, *Sagwa*. This use was suggested originally by Dr. G. U. Hay and the names were devised in part by myself and in part by Dr. W. O. Raymond and others. Their genesis is fully explained in the *Educational Review*, XVI, 189, and individually in the Dictionary following.

209. A comparatively new, but somewhat important, element has recently been introduced into New Brunswick Place-nomenclature. The last ten years have seen an immense development in this province of big game hunting by American sportsmen, in connection with which many guides have opened up new hunting-grounds among the remote ponds and lakes. It has become customary among them to name these places for the first sportsman who shoots a moose there, or who in some other way becomes associated with the place. Thus a large number of little lakes are being named for American sportsmen whose connection with those places is of the most transient sort, though the name will unquestionably persist. I have collected many of these names in my

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various articles in the Bulletin of the Natural History Society of New Brunswick (see especially V., 227).

211. A phase of New Brunswick Place-nomenclature of very great interest is the entirely unwritten nomenclature used by the lumbermen for the various minor features along our rivers. Surprised by the extent and character of these names, I have tried to collect them for all of our principal rivers, obtaining them, when possible, directly from the lumbermen in person, and in other cases from reliable persons as intermediaries. I gave a list of those of the Magaguadavic and of the St. Croix in the Place-nomenclature monograph, but I have since gathered a more complete list for the St. Croix, and new lists for the Oromocto, Lepreau, Nepisiguit, Salmon River, (Queens), the Tobique, upper part of the Main Southwest Miramichi, Little Southwest Miramichi, Northwest Miramichi and Renous and in part for the Upsalquitch and Restigouche. I regret that the limitations of space do not permit me to give them in these pages. These names have evidently grown up naturally in the course of the use of the river, and apply to each object seriously affecting the interests of the lumbermen,—the rocks and bars which obstruct their logs, the rips, rapids or falls which give the river-drivers much trouble, the brows, landings, pools, brooks, etc., each with their effect upon the daily life of the users, requiring them to be mentioned in talk and hence to have names. Since they are entirely unwritten and occur upon no map, it is plain that they have not arisen in any literary way, or through any abstract considerations; but they are the spontaneous expression of the naming instinct. They are, therefore, of interest and value as illustrating the principles by which place-names arise and as reflections of the psychology of primitive name-givers. Incidentally, they have also other values, in exhibiting the topographical terms in local use, and in affording some method of testing the permanency of unwritten names. That many of these names have been long in use is shown by their occurrence in various earlier documents, and it will be easy for the future student by noting whether they are still in use to determine their future persistence.

Viewing the lists of these names, comprehensively, it is plain that the probable origin of the great majority is evident at a glance, while a few are not thus self explanatory. The majority of the latter are without doubt of Indian origin, namely, *Naleguagus*, *Guagus*, *Slugundy*, *Bittaback*, *Allabanket*, *Onlockywicket*, *Ponwauk*, and the half Indian *Long Lookum*, all considered in the following Dictionary; and these

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constitute a most welcome addition to our surviving Indian names. Other names of familiar aspect, such as *Baltic*, probably are slight corruptions of familiar words. But all of the remainder, and hence the great majority, are of the simplest possible type, and all obviously descriptive. The descriptive names are of two general kinds,—the many recalling some familiar object, and those possessives including some person's name. The reasons for the former are usually obvious enough, even though some imagination must be used to perceive the connection, while as to the latter, at least a possible explanation is equally obvious. Indeed, if one asks a lumberman the reason for a given one of these names, he usually responds by relating some incident connecting the person with the place, as when a person was the first to lumber there, or was drowned there, or had some adventure or misadventure. These explanations, may or may not be true, but certainly they are true in principle, if not in detail. While not affected by any form of literary influence, this nomenclature is affected by suggestion and recollection of other localities, for only thus can we explain the repetition of certain favourite names on several rivers. Thus, *Oxbow*, *Redbank*, *Spilt Rock*, *Narrows*, occur upon several rivers, as do *Governors Table*, *Hells Gates*, *Devils Elbow*, *Long Lookum*, *Big Hole*, *Chain of Rocks*, etc., while the expressive and familiar phrase for a bad rapid *Push*, (or *pull*), and *be damned*, occurs upon nearly all of them.

Summarising then this type of primitive nomenclature, it is plain that it is in part repetitive, thus retaining some Indian names, in part associative as shown by the more fanciful names, hardly, if at all commemorative, but overwhelmingly descriptive. It represents well, I believe, the typical mode of origin of names when they arise naturally.

212. A curiosity of place-nomenclature of New Brunswick is a rare post office directory of 1857. It gives, apparently, corrupted phonetic or vernacular names of a great number of New Brunswick Settlements. Of these names some are recognizable, such as *Jewaniel* (Juvenile), *Bonna Gonnea* (Bonhomme Gould), *Cannabec* (Canobie), *Grimmack* (Greenock), and others, while many, such as *Charwest Point* (Kings), *Saltash* (Gloucester), *Whillway* (Northumberland), and many others are now quite unrecognizable. The elucidation of these names forms a pretty puzzle!

212. We have in New Brunswick some descriptive names which are strikingly appropriate and pleasing as well,—notably *Green River*, *Red Rapids*, *Blacklands*, *Crooked Deadwater*, *Clearwater*, and (perhaps only accidentally appropriate) *The Wolves*.

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Another peculiarity of our nomenclature is the common shortening of some names to a single syllable with a distinguishing prefix *the*; thus Welshpool is locally often called "The Pool," the North Pole Branch is "The Pole," the Otnabog is "The Bog."

213. From the list of words of unknown origin on this page, Sunbury, and Wickham are to be removed, and Bay du Vin, Yoho, St. Martins are to be added thereto.

Other classes of names worthy of careful study are:—(6) Street names of the cities and towns, (7) names of school districts which contain a large number of very interesting forms, (8) names of post offices, many of which will become important names of the future. A remarkable, though very trivial series of local names, largely embodying a humorous element, is that of the Weirs in Charlotte County.

214. A very large number of pleasing place-names, taken from our historical past, are available as new names are needed. I have given a full list of these in the *Educational Review*, XV, 204.

214. The confusion in the spellings of many place-names, here referred to, is now being remedied by the Geographic Board of Canada, organized for the express purpose of standardizing the spellings of place-names in Canada. This Board has published four Reports in which are found many New Brunswick names. Most of the decisions of the Board are admirable, but others, owing to a deficiency of local knowledge, and perhaps to somewhat too great haste in forwarding this important work, are unfortunately so far out of sympathy with local usage as to make them unacceptable to those most interested in the subject. I have expressed my opinions upon these decisions in an article in the *St. John Daily Sun*, Dec. 3, 1902, to which a reply was published by the Board in the same paper for Feb. 28, 1903; an answer to the Board, to which no reply has as yet appeared, was printed in the same paper for March 16, 1903. The subject is also discussed, with a list of the preferable forms, in the *Educational Review*, XVI, 189, Feb. 1903. At the present writing, I understand the Board is again to consider these special names in the light of new information about them. In the meantime I have given, in the Dictionary of place-names following, all the forms not already adopted in the Monograph, which seem so good that they ought to stand, omitting mention of the cases still in doubt.

215. A Dictionary of the Place-names of New Brunswick.

Since the publication of this work, a great amount of new information has come to light, and the more important of this I aim to give in the following pages. I have taken especial pains to give the best form in all cases where more than one spelling of a name is prevalent. For the sake of brevity I have omitted all settlement names whose origin is clearly implied or stated in the Settlements Monograph, and have used the following abbreviations;—*P*, means parish and the date is that of its erection, *Bull. N. H. S.* refers to the Bulletins of the Natural History Society of New Brunswick, the *Land Memorials* are the documents fully described in the Settlements Monograph, 181. The phrase "first occurs" signifies that this is the earliest use of the names I have been able to find.

Aberdeen.—No doubt so named because the settlers of *Glassville* (to include which the new parish was, of course, formed) came mostly from Aberdeen, Scotland, in 1861. But also, possibly, it may have been in honour of the then Governor of the Province, Hon. Arthur Gordon, whose family name was Aberdeen. Perhaps the name was chosen with both facts in mind.

Aboushagan.—First as *Aboushagin*, in 1803, in *Land Memorials*.

Abshaboo, not **Ashaboo** (Cooney, 169).—It is possible this point was named for Etienne Abchabo, an Indian chief of Pokemouche, mentioned by Cooney, 37.

Acadia.—This name is more fully discussed in the *New Brunswick Magazine*, III, 153; in the *Educational Review*, XVI, 12; and in the *Monograph on Boundaries*, 161. The current explanation is given by Dawson, in his *Acadian Geology*, and also in the *Canadian Antiquarian* for Oct., 1876.

Acamac (formerly *Stevens* on the C. P. R.).—Recent simplification of the Indian name of South Bay. (See a few pages earlier).

Adder Lake.—Given by Garden, the surveyor, in 1838, no doubt because it is in fact the Little Serpentine,—a little serpent—an adder. The local names of the waters above this lake are fully discussed in *Bull. N. H. S.*, V., 67.

Addington.—Without doubt for Henry Unwin Addington, later Viscount Sidmouth, who in 1826 was made one of the English plenipotentiaries to treat with the Americans over the northeastern boundary. The other was William Huskisson (see *Huskisson*), and the fact that these two parishes were named in the year they were appointed makes this certain. (Moore, *International Arbitrations*, 87; also *Boundaries Monograph*, 331).

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Alamec.—Called by the Acadians of Shippegan and vicinity *Lamec* (commonly spelled *L'Amec*, or *Lameque*, etc.), while the English residents in the vicinity usually call it *Alamec*. It is no doubt from the first two syllables of the Micmac *El-mîg-wa-da-sik*,—"the head is turned to one side" (Rand, Micmac Reader). First occurs as *Petit* and *Great Nanibegue* on a plan of 1784.

Aldouane.—I am told by the Indian teacher at Big Cove, Richibucto, that the Micmacs pronounce this name *Wald-won*, but are doubtful if the word is Micmac. They have also another name for it, *Sgapagnetj*. It is possible that this name has some connection with a French vessel, with cannon on board, traditionally said to have been sunk at the mouth of that river (see later under the Acadian Period), in which case the name would be homologous in origin with *St. Simon* and, perhaps, *Bay du Vin*.

Allabanket.—A place on the lower Main Southwest Miramichi; the name is still in use, and, no doubt, of Micmac origin.

Allandale.—Said locally to be so named for a resident "at the end of the road" (Lieut. Adam Allan?) with the addition of *dale*.

Allans Creek (near Meringuin).—Said locally, and probably correctly, to be so named because the American partizan, John Allan, landed there when he escaped from Cumberland in a boat after the Eddy Rebellion in 1776.

Alma.—P. 1855. Hon. A. R. McClelan tells me the name was suggested by the heights behind it recalling the place of the great victory the year before. On this occasion the New Brunswick Legislature sent an address to Her Majesty congratulating her upon the success of her arms at that time.

Almeston.—No doubt a mis-spelling of *Osmaston*, the ancestral home in Derbyshire of Sir Robert Wilmot, who had an early grant within this Township, and who was uncle of the then Governor of Nova Scotia, Hon. Montague Wilmot. (Fully discussed in *Educational Review*, XVI, 12.)

Alston Point.—First used on plan of 1828. Alston is a New Brunswick family name, and hence may have been given for a resident. Could it be a corruption of Allen's, name of the first grantee of the point?

Alva, Loch.—As pointed out in *Acadiensis*, III, 16, the origin of this name still eludes me. I am now inclined to think, however, that there is some connection between a Loch Lomond a few miles east of St. John and a Loch Alva of about the same size about the same distance west of the city. Loch Lomond was named about 1810 by Lachlan Donaldson, a Scotchman, and early mayor of St. John, who had a grant of land near it; I am inclined to think that Loch Alva was named by Hon. Hugh Johnston, who received a grant of land on the Musquash River, in 1808. The proprietors of Alva House

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at Alva, in Scotland, are Johnstons. It seems to me possible that Hon. Hugh Johnston was connected in some way with them, and that where he or Donaldson, both Scotchmen and prominent residents of St. John, named a Loch near his property for his native land, the other followed suit. In this case Perley did not give the name, but simply adopted it.

Andover.—P. 1833. Said locally to have been so named by Mr. Sisson, an early resident, who came from that place in England.

Antinouri Lake.—This curious name is used locally, but its origin is unknown to residents in the vicinity. It seems to make its first appearance on the Geological Survey map of 1881, but Dr. R. W. Ells, author of that map, tells us he does not know its origin, though he obtained it from his guides in 1880. Recently, however, Mr. D. McMillan, who has long known that region well as Surveyor, has given me an origin which I believe to be correct, namely, that in former days the lake was called by the old residents Anthony Ree's, or Antony Ree's lake, after an old hunter of that name. He adds that one Anthony Ree was not long since a resident of Bathurst. This, pronounced by Dr. Ells' French guides, and taken down phonetically, would very naturally give Antinouri. Locally, it is said to be pronounced an-tin-oo-re, with accent on the third syllable.

Aroostook.—On D. Campbell's map of 1785 as *Restook*, followed by others. I think it very probable that *Woolastook*, *Aroostook*, *Restigouche*, and the Micmac name *Lustagoocheech* of the Miramichi are all fundamentally the same word, all signifying something akin to our phrase "The Main River." Campbell also calls it *Jacquo's River*. In a return of Indians living at Tobique in 1841 the names Jacques and Jacquo both occur. I have no doubt that the name was given it by the French for some chief whose especial hunting ground it was, a method of origin characteristic of many of our river names (compare *Place-nomenclature*, 189).

Arthuret.—Historically and in every other way a better form than the recent *Arthurette*.

Atherton.—Supposed by Raymond (Coll. N.B. Hist. Soc. I, 331) to have been applied at one time to Fredericton, but he writes me this is entirely a mistake, due to a misreading of an early letter.

Aucpac.—A collection of the remarkably-diverse spellings of this word has been made by Raymond in his "St John River" (page 142). Earlier uses are found in the census of 1733, having *Ecoupay*, in a document of 1735 in the Nova Scotia Archives (II, 98), naming *Oepagne* (misprint no doubt for *Ocpaque*), and in a treaty of 1721 given in Baxter's "Pioneers of France in New England" (page 118) as *Kouupahag*.

Aulac.—Occurs first in a document of 1746-1747, mentioned by Parkman. Called "Number 1" in early times by the English because including No 1 "body" of marsh (viz., a mass of marsh enclosed by a single dike).

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Baie Verte.—A much better form, historically and otherwise, than Bay Verte.

Baker Brook.—In the Land Memorials of 1820 it is said, "N. Baker asked land at the mouth of the Marinequanticook or Turtle River."

Bald, Cape.—In French, called *Cap Pelée*, a name coming into general use. The latter appears to be corrupted to Cape a Lee in Land Memorials of 1807.

Bald Mountain.—This name occurs several times in New Brunswick. In some cases alternative names have been proposed as follows:—

LOCATION.	ALTERNATIVE NAME.
South of Nictor Lake.	<i>Sagamook</i> (Gordon, 1863, "Wilder- ness Journeys," 54).
Head of South Branch Nepisiguit, "Big Bald."	<i>Kagoot</i> . (1903, Bull. N.H.S. V, 215).
Above Indian Falls on Nepisiguit.	Denys Mountain (1899, Bull. N.H.S. IV, 255).
Southwest of latter, "Little Baldy" of guides.	Cartier Mountain (1899, Bull. N.H.S. IV, 255).
Southwest of latter, "Little Baldy" Long Reach.	Champlain Mountain (Bull. N.H.S. IV, 321, and the <i>St. John Star</i> and <i>Globe</i> , of June 23, and <i>Sun</i> and <i>Telegraph</i> , of June 24, 1904).
Near Harvey, York County.	<i>Wedawamketch</i> (1901, Bull. N. H. S. IV, 321). It is called, apparently, Goodawamscoop Mountain on the Sproule Map of 1787, and it is called Lambton's Mountain (for Lieutenant Lambton, who was there in 1784) in the Field Book of the Magaguadavic Survey of 1797.

Bald Head, near Riley Brook is so appropriate and distinctive that no alternative therefor is desirable.

Balmains Point, Grand Lake.—Said in a newspaper article to have been called by the Indians *Woccasoon*.

Baltic.—Name of a cliff and eddy in the upper Oromocto, origin not known.

Baltimore.—Settlement in Albert. No doubt connected, though I do not know in exactly what way, with the fact that some of the original proprietors of Hillsborough were from Baltimore in the United States. Very likely some of the early tenants were from that place, and their descendants founded this settlement. (Albert County Maple Leaf, Sept. 2 and 9, 1886).

Bantelorum.—A brook on the upper part of Cains River. Of Indian origin? It is on Fairweather's plan of 1836 and in general local use.

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Barreau, Point.—Origin locally not known. A map of 1804 calls the island (or grove) there *Pt. de Bar* [Bass Point] which may have become altered to Barreau. Barreau in Acadian means a partition, etc., and the point may be so named for the way it separated Tracadie and Tabusintac. A local tradition also derives it from the name of an Indian who formerly camped there.

Bartholomews River.—In this form in 1809 in Land Memorials.

Bay du Vin.—It is very likely the origin of this name is to be found in some connection with the French frigate said to be sunk at the mouth of the Bay du Vin River (see later under the Acadian Period). It is to be remembered that Marston said in 1786 that the place was so named from the French captain who first anchored here, and it may be that either the captain or his vessel bore a name which has been corrupted to our present form. In this case the name would be strictly homologous in origin with that of St. Simon, later considered, and, perhaps, also with Aldouane. The earliest use of the name is in the form *Baie des Ouines* in a document of March 3, 1760.

Of other possible origins there are several, of which one thinks first of some connection with the Vinland of the Northmen, suggested by Bishop Howley in these Transactions IV, ii, 97. Another is suggested by Murdoch's Nova Scotia, II, 217, where he refers to a Père Badouin, at one time in Acadia. In this connection we recall that DesBarres in his charts of 1780 used the form Bedouin. There is also a stream called Ouine in Poitou, France, and one might imagine that the name has been brought here by early priest or settlers.

The local names in the vicinity are mostly self explanatory. John O'Bears Point, at lower Bay du Vin, is known locally to be a corruption of John Hebert. The eastern end of Vin Island is known as John O'Groats, though it is not known by whom that name was applied.

Belas Basin.—On a plan of 1836 the name Belos (Bellows?) is applied to a rock off the entrance to Lepreau Basin, and the word Basin is in such a position that the two might naturally be thought to form one name. It is probably thus that this name, which is locally unknown, came upon our maps.

Belleisle Bay.—Named, as M. Gaudet, Dr. Hannay and Dr. Raymond have all pointed out to me independently, from the French family of that name living on the St. John in late Acadian times. Murdoch (Nova Scotia, II, 255) shows that M. de Belleisle was settled on the St. John in 1754. M. Gaudet has documents which show that in 1737 Pierre Robichaux married Françoise de Belleisle, and in 1739 François Robichaux married Marie le Borgne de Belleisle, daughters of Alexander Le Borgne de Belleisle, then living on the St. John. Now, the Monckton map of 1758 shows "Robicheau," a group of several houses, at the mouth of the Belleisle. Hence it seems reasonable to infer that the Robicheaus settled near their father-in-law, who was settled at the mouth of the Belleisle, which accordingly took its name from him.

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Belvisor Bar.—On the St. John, above Meductic Falls. Used locally, but origin not known. *Belviso* occurs in a return of Survey of 1785.

Benton.—Said locally to have been named for a prominent American soldier (T. R. Benton?), though this seems unlikely.

Bittabock.—Name, locally known and undoubtedly Micmac, of a rocky island on the lower Nepisiguit. Being a well-known fishing place, it is mentioned in sporting books by Lanman, Norris, Campbell and Roosevelt.

Black Brook (near Loggieville).—Said locally to be a corruption of Blake's Brook (confirmed by the presence of *Blake's Flats* near by) for an early resident, traditionally said to be the Captain Blake who commanded the vessel which destroyed *Burnt Church* (narrated in Cooney, 35).

Bonum Gould.—Name of a settlement in Westmorland, so called for a prominent Acadian resident, apparently Bonhomme Gould.

Brideau, Rivière à.—Said locally to be so named for a former resident. It is a Canadian-French name.

Britt Brook; also Portage Lake Stream.—A New Brunswick family name; no doubt for some early lumberman.

Burgoin's Ferry.—On the St. John, established in 1817. No doubt for the Acadian family Burgoin, formerly, and still, residents of Upper French Village near by.

Burnt Church.—The teacher of the Indian school at Church Point, Charles Bernard, himself a Micmac from Cape Breton, has kindly given me the aboriginal Micmac names of a number of places in the vicinity of Church Point. I give them here precisely as he writes them to me. Some of them I have no doubt are correct, but as to others, especially in the meanings, I am doubtful. The Indian village here he gives as *Esginoo o putich*, fully confirming the name from other sources. Burnt Church River has no Indian name, he says, other than the village name with Seeboo added. Portage Island, *Mogulawecchooacadie*, meaning, "A place where the Brant Geese are plenty and they are generally shot, as it were"; River de Cache, *Peskej*, meaning "little branch"; Grand Dune River, *Abcamkej*, meaning "lined bottom" (?); Stymest's Millstream, *Akbaseck*, meaning "it curves"; Neguac, *Annikoock*, meaning "Annie is wandering alone," explained as the expression of an Indian whose wife, named Annie, became lost (!!); Hay Island, *Ooenjooi, Menigoo*, meaning "French Island"; Portage Brook, *Gasbalaoocadie*, meaning "Gaspereaux are abundant," by some Indians called *Matiojek*, said to mean place where lived an Indian woman, Malioj; French Cove, *Skassikuakenek*, meaning "place of torching."

Cabin du Clos.—Name of the point separating the upper from the lower part of Tracadie Bay. It is now simply a piece of low wooded upland (forming a very charming camping place), and is said locally to have been named from the camp or cabin of an Indian named

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de Clos, formerly living there. It is of interest to note that this name de Clos occurs as that of an Acadian family, early residents of Point Brulé, Shippegan, who afterwards removed to Shippegan Island.

Calamingo Brook.—Called *Comingoes Brook* in the original grant of 1823, *Conomingo* or *Conomingoes Brook* on other early plans. I am told by Mr. W. A. Colpitts, of Mapleton, that traditionally Conomingo is said to have been a half-breed who hunted there, and this explanation is very probably correct. *Dove's Hollow*, nearby, is said to have been named for another hunter.

California.—Name of two or more settlements in New Brunswick, probably given at the time the "emigration fever" to that place was at its height, in half-humorous allusion to these settlements as substitutes. Thus, Johnston (*Travels in N. A.* II, 39), who was in New Brunswick in 1849, speaks of the fever for emigration which swept over the country at intervals, and says, "the California paroxysm is at its height." Compare *Ohio* later.

Campbellton (Restigouche).—The Indian name for this locality, as I am told by Mr. D. Ferguson, of Chatham, formerly of Athol Farm, who knows the place and the Indians well, is *Wis-i-am-ca* or *Was-si-am-kik*, meaning "to be muddy," referring to the stirring up of the sediment of the river by the current in the narrowing of the Restigouche here.

Mr. Ferguson also tells me that the lower part of the present Campbellton was laid off in 1833 and named in honour of the then Governor of New Brunswick, Sir Archibald Campbell, though it was long before the name replaced the earlier *Martin's Point*, so named for a captain who had built a vessel there.

Campobello.—On the names of the island consult the Journal of Captain William Owen, in Collections of the N. B. Historical Society, Vols. I and II.

The first known name for this was *Passamaquoddy Outer Island*. In view of the fact that the name Passamaquoddy originally applied to the waters between Deer Island, Campobello and Moose Island (see Passamaquoddy), and not to the inner bay as at present, this name was a natural one for Campobello. Mr. J. Vroom has made the interesting suggestion, however, (in a letter) that the name may be a survival from the French, originally some such form as *L'isle outre Passamaquoddy*, and he further suggests that the *oultre* from which *Harbour de Lute* is supposed to have been derived, is this same word and not the French for Otter. Though without any support other than the resemblance of name, Mr. Vroom's suggestion may yet prove to represent fact.

Canoose.—This is explained by Gatschet (*Eastport Sentinel*, Sept. 15, 1897) as from *Kanusyik*, pickerels. I suspect the accuracy of this, since the pickerel is believed to be a modern introduction into these waters. This spelling represents very closely the pronunciation, and is preferable to other forms proposed or in use.

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Canterbury.—P. 1855. No doubt named in honour of Hon. Manners-Sutton, in that year Governor of the Province, who himself became Lord Canterbury in 1869. The fact that this parish and Manners-Sutton were named in the same year is very strongly confirmatory of this explanation.

Car, Pointe au.—Without doubt a corruption of *Pointe au Quart*, that is, point of the square or right angle, which is precisely descriptive. All stages in the development of the word may be followed through the references under *Quart-Point* in the *Place-nomenclature*.

Caraquet.—Locally pronounced with very strong accent on the first syllable. The plan of Caraquet River, made by Davidson in 1836, has the following names for the brooks forming its branches, reading from above downwards:—*Innishannon, Youngs, Adams, Serby, Tauris, Esk, Ewes, Waughope, Bertrands*. Some of these are evidently local, but others appear to be fanciful, and their origin is not plain.

Carleton Lake, in York County.—Called in a grant to Francis Allen in 1827 *Carlton Lake*, and said to have been named for Governor Carleton.

Carleton, Mount.—The highest mountain in New Brunswick (about 2,700 feet). It was unnamed until 1899, when it was called in honour of the first Governor of New Brunswick (*Bull N. H. S.* IV, 251).

Carleton, St. John.—On this name and proposed alternatives see Raymond, *Canadian History Readings*, 51. Also on the Carletons, and places named for them in Canada, see Johnson, in *Canadian Magazine*, XII, 289.

Carleton, Fort.—A temporary name of the military post at Presquile.

Caron Point.—On plan of 1828 as *Carron Point*. Caron is a French family name, and it is likely it was given for some such person. There is a Caron Brook in Madawaska. There is, however, a Loch Caron in Scotland, and it may possibly be a repetition of that.

Cassies Point.—For the Acadian family Cassie, originally the Irish *Casey*, early grantees there.

Cavanaghlisht.—(Of *Place-Nomenclature*, 224) is a misprint of Cavanagh's Point, which is in the *Land Memorials* for 1798.

Caverhill.—So named for Dr. Caverhill, a leader among the first settlers.

Chaloupe, Ruisseau La.—See under *St. Simon*, later.

Chamcook.—In the *St. Andrews Standard*, for Oct. 7, 1837, is advertised for sale "at Beau-Sejour, on the premises, the eastern half of Ministers lot (so called) . . . at a short distance from the Chamcook Mills . . . bounded by the waters of Passamaquoddy Bay, Craig's Land and the property of the Church . . . on the lot are two dwelling houses, one at Beau-Sejour, the other at Weepemaw . . . private road leads through the lot to Tasse d'argent Cove on the bay, which forms a good harbour for small vessels." I have no further information as to these interesting names.

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Champlain, Mount.—Proposed in 1901 (Bull. N.H.S. N.B. IV, 321) as an alternative for Bald Mountain on the Kings-Queens Boundary—and again in connection with the Champlain Tercentenary at St. John, June 24, 1904 (St. John newspapers of June 23, 24). It first appears upon White's map of 1906.

Champlain, Village.—Name applied in July, 1905, at the suggestion of the present author, to a hamlet of summer houses below St. Stephen, nearly opposite DeMonts, in Calais.

Charlo.—*Little Charleau* in 1799 in Land Memorials. Charleau is said to be a not uncommon Acadian form of Charles.

Chatham.—According to tradition, as I learned from Mr. William Innes, of Bartibog, through Rev. Father Morrissey, Chatham village received its name in honour of the younger Pitt, Earl of Chatham. The name was suggested by Mr. Francis Peabody, a prominent resident, and replaced the earlier name, *The Spruce Tree*, so-called for a great spruce that stood on the present site of Ritchie's store on Water Street.

Cheniré, Lake.—See under *Miscou*.

Chiputneticook.—On Sproule's map of 1786 as Cheputnatecook. In Harris' Field-book of 1797 survey of the river as "River *Chiputnaticook* (called by the natives *Chibnitcook*)," seeming to show that he took the former from some other source (such as his instructions), and the latter directly from the Indians. The Indian names of these lakes are discussed in Boundaries Monograph, 265.

Clair.—P. 1900. So named from its principal village, which was named for Peter Clair, a former prominent resident, whose descendants are numerous in the vicinity.

Clearwater.—One of the best of our descriptive place-names, occurring several times. No doubt the name is suggested not so much by the colour of the water in the stream itself, as by the striking contrast of the clear water entering a more turbid stream, a feature I have noticed on the Sevogle. In the same way, I think, the names Green River, and Grog Brook (Upsalquitch) were suggested by the colour contrast their waters present to those of the streams they enter.

Cleuristic.—*Clusostick* on Sproule's map of 1786; and the same on D. Campbell's of 1799. This form is nearer the original Indian (Kulloosisik) than the modern form.

Coldbrook.—Originally Colebrooke, a settlement established before 1843, and named, no doubt, for the then Governor, Sir William Colebrooke.

Colebrooke.—Former name of Grand Falls. An old newspaper item says Colebrooke and Edmundston were named about the same time (1848), one for the outgoing and the other for the incoming Governor.

Cootes Hill, or Headline.—A Protestant Irish settlement, very likely named for the Irish baronet of that name.

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Corneille, Ruisseau.—A name applied in 1686 apparently to French Fort Cove, Miramichi. (Compare later under "Settlement of Richard Denys de Fronsac.")

Coude, Le.—M. Gaudet tells me this settlement was at the Bend (Moncton) not above it.

Courtenay Bay.—Historically the better form, and that used locally on maps, though in pronunciation shortened to "Courtney."

Cowassaget Brook.—On Tabusintac, at northernmost bend of tidal part of river. As *Coucassagets* Brook in Land Memorials of 1808. Used locally and pronounced Cô-wass'-a-get (g hard). Undoubtedly Micmac, but meaning unknown to me.

Crocks Point (above Keswick).—No doubt for¹ an early Acadian resident, surnamed *Croc* (see Raymond, Canadian History Readings, 336). Confirmatory of this is the occurrence of the name Crock in the Madawaska census of 1820, and of a *Crocks Island* below the mouth of the St. Francis.

Crooked Creek (Shepody).—Descriptive, and used in the Calhoun diary of 1771.

Dalhousie.—The hill back of the town was formerly called Charleforts hill. The Crown Land Records show that one Pascal Charlefort had a grant here in 1832.

Damascus.—In a Post Office Directory of 1857 in this form. Said locally to have been given on the spur of the moment to an inquiring "map-maker" by a resident as a kind of joke; but, placed on the map, it became adopted in earnest.

Deep Creek (near Newburg).—Called *Monomocook*, doubtless its Indian name, on Johnson's map of 1817.

Demoiselle, Cape.—As *Cap de Moselle* in the Calhoun Diary of 1771. At this point is the place locally called "the Rocks," where the soft sandstones are wonderfully carved into pillars, arches, etc. It is very probable that some one of these took the form of a woman, this giving origin to the name.

Digdeguash Lakes.—The nomenclature of these lakes is given in the Bull. N. H. S. N. B., V, 47. Locally the name is shortened to *Digity* or *Dikety* Lakes.

Dipper Harbour.—Thus on a plan of 1784. Said by Reynolds (N. B. Magazine III, 53, and confirmed in Fisher's Sketches, 51) to have been called Dippoo in early times.

Dochet Island.—Its various names are fully discussed in the Monograph on this island in these Transactions, VIII, ii, 142.

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Douglas Mountain, and Valley and River (for west branch of Nerepis). These all make their appearance in 1826, the year the surveys for the Fredericton-St. John Road were made under the direction of Governor Sir Howard Douglas. They were no doubt named for him. The popularity of Sir Howard is evinced by the many places named for him in New Brunswick—comprising Douglas Parish, Douglas Mountain, Douglastown, Douglas Harbour, with Howard Settlement and Howardville which have disappeared.

Douglastown.—Named a few months before the great Miramichi fire for Governor Douglas, who visited the Miramichi at that time (Cooney, 64).

Drury Cove.—Also *Portage Cove* on earlier maps, and earlier *Hunter's Cove* (N. B. Mag., II, 324).

Dumbarton.—P. 1856. Within this parish a grant was made to the St. Andrews Highland Society, and I believe there is some connection between this fact and the origin of the name.

Dundas.—c. 1826. Without doubt this parish was so named in honour of Ann Dundas, the wife of Sir Howard Douglas, then the popular Governor of New Brunswick. The parish of Douglas had been named for Sir Howard two years before. (Discussed in the Educational Review, XV, .160).

Dungarvon.—It seems there is no river of that name in Ireland—only a parish and harbour; my explanation of the name is very likely incorrect.

Dunsinane.—Said to have been named by Robert Shives, Emigration Agent at St. John, whose father was a Scotchman.

Enaud, Point.—In Bathurst Harbour. A persistence, no doubt, of the name of the early French settler, Enaud (Henault, etc.). See Historic Sites, 298, 300.

Ennishone.—Said locally to be named for a township in Ireland, though such does not appear on maps of Ireland. Probably the same as Innishowen. The earliest settlers were largely Irish.

Enragé, Cap.—A French name; called by English residents Cape Enrage, but also corrupted to *Roshea*, and applied to the bay to the westward (see *Roshea*). This is made clear by a passage in the Calhoun Diary of 1771 which reads:—"Cape Roshea, called by the English Cape Enrage from a ledge of rock to the S.S.W. which, in high winds, makes a very rough sea."

Fairville.—So named for the founder, Robert Fair, from Ireland, of whom obituaries appeared in the St. John papers of Sept. 2, 1901.

Filomaro.—See Philmonro.

Foxbury.—A place mentioned in Land Memorials of 1800, as location of lots owned by Judge Saunders; possibly the *Foxerbica* of Leland.

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Francfort.—This Pre-Loyalist township was very probably named for the place of that name near Philadelphia (shown on a map of 1777), rather than, as supposed by Johnson, from being at or near the French Fort [at Nashwaak].

Frenchmans Creek (Musquash). This is very probably connected with the fact mentioned in the Quebec Documents, II, 152, under date 1694, which says that in the Harbour of Nigarscorf [misprint and corruption of Mes-gos-guelk, the Indian name of Musquash Harbour], three leagues from the River St. John, Captain Baptiste with his corvette La Bonne spent the winter of 1694-95. Compare Gesner's note. I find it as *Frenchman's Brook* in a plan of 1820.

French River, Bay du Vin.—Settled by Acadian families, as described in the Settlements Monograph.

Gallows Hill. (Kingston, opposite Gondola Point).—So named for the two executions which took place there while the King's County Court House stood in the vicinity (*St John Telegraph*, Aug. 23, 1935.)

Geary.—I have at length been able to determine the origin of this name. The earliest use of the word I have found is in the Land Memorials of 1811, where it is called *New Gary*, though under 1807 it appears to be mentioned as a "new settlement back of French Lake." Mr. Thos. E. Smith, of Geary, tells me the name was suggested by his grandmother, his grandfather, Samuel Smith, being the first settler there. They came to New Brunswick from the United States as Loyalists, and remained for a time at Niagara, then locally pronounced "Niagary." Later they came to New Brunswick, and in settling here gave the name *New Niagary* to the new settlement, which name became changed to *New Gary*, and finally the New was dropped, and it became Gary or Geary. The same explanation has been given me by Mr. Leslie Carr, of French Lake. This tradition is finely confirmed by a mention of the settlement I have found in the Royal Gazette for Apr. 14, 1818, which calls it *New Niagara*, and I have no question the explanation is correct. It appears as Geary in 1818 in a MS. Journal of C. Campbell.

Geologists Range (in Restigouche-Victoria).—So named in 1899, as described in Bull. N. H. S., IV, 251; V, 87.

Geordie Lake, on Rocky Brook.—Named for an old hunter, as fully explained in *Forest and Stream*, May 17, 1902, 386.

George, Lake.—Raymond (St. John River, 7) says, this name is explained locally as given for John McGeorge, who settled there in 1816; he was killed by Indians in 1822. The same explanation is also given locally.

It is also stated in the *New Brunswick Courier* for Feb. 2, 1822, that it took its name from him, which seems conclusive.

Earlier its name appears to have been Nine-mile Lake, as shown by a notice of the settlement there in Royal Gazette, Feb. 29, 1820.

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Germantown Lake.—The name Germantown (located on Map No. 25 later) was used for the settlement of Shepody in 1768 (Canadian Archives, 1886, 488, 492). No doubt it was so named for Germantown, Pennsylvania, from which some of the first settlers came. A fine plan of 1801 has "German, or Sheppotee Lake."

Gilmour Brook, Nepisiguit.—Of course for the William Gilmore, the angling schoolmaster, an interesting character described by Lanman in his "Adventures," II, 31-33.

Glenelg.—P. 1814. So named for the native place in Scotland of Major McDonald of the 78th Highlanders, a prominent resident, who settled here about 1790, as I am told by a well-informed local authority, Mr. D. Lewis, of Escuminac.

Gloucester, County.—Named in all probability for Mary, fourth daughter of King George III, who married the Duke of Gloucester in 1816 and was devoted to good works.

Golden Mountain, Albert.—A common corruption of Gowland Mountain, so named for the leading family there.

Gondola Point.—In this form in the Land Memorials of 1786.

Gooldsborough, at mouth of the Oromocto.—Explained by Raymond in Coll. N. B. Hist. Soc., II, 50.

Gordon Falls.—Named for Governor Gordon, who visited them while in New Brunswick (local statements and St. John *Sun*, Aug. 29, 1888).

Grande Anse, Bay, Dune, Falls, Lake, Point, River, Ruisseau.—The *Grand* is, of course, a persistence of French nomenclature. As applied to all features, except river and brook, its meaning of big is perfectly appropriate, since those features are pre-eminently conspicuous in their localities. We have, however, also Grand River in Madawaska County, and a Grand Ruisseau in Shippegan (north end), while Eel River at Bay du Vin is also locally so called. These are all comparatively insignificant streams and the reason for the application to them of the term grand is not obvious. I believe, however, that the word is here used precisely as in the common French phrase *grand chemin*, which means a "highway." The two great rivers above mentioned were parts of important early portage-routes, and very likely Grand Ruisseau was part of a route to the interior lakes of Shippegan, though also it may have meant simply the largest brook of the vicinity.

Grande Dune.—Preferable to Grand Dune, because correct French.

Grandigue.—Presumably so called for the great dike or bar which makes out to the southward from the point.

Grand John Brook.—Said to be named for an Indian of that name who used to hunt there.

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- Grand Lake, Q.**—An old newspaper article in the *St. John Sun* says that a Mr. Garrison, prior to the coming of the Loyalists, surveyed this lake and gave names to Cumberland Bay, Salmon River, Newcastle, etc.
- Grand Manan.**—The *Great Mary* island of McDonald's Reports originated with David Owen, and represents one of his attempts to give a French origin to the Indian names of Passamaquoddy. (See at end of Dictionary). The Indian names for several places on or near the island are given by Gatschet in the *Eastport Sentinel*, Sept. 15, 1897.
- Grand River.**—Occurs first in Sproule's map of 1787 (see Map No. 39 later) as "Quidasquack, by the French Grande Rivière."
- Grays Island, Albert.**—So named for its first grantee, a Major Gray. In the Calhoun Diary of 1771 it is called Delatong's Island, no doubt an Acadian name.
- Green Hill.**—The name in 1783 of the hill on which the Burton Court House now stands. (Coll. N. B. Hist. Soc., II, 296).
- Green River.**—On Sproule's map of 1787 (Map No. 39) called "Quamquerti-cook or Green River."
- Greenwich.**—P. 1795. Possibly for Greenwich, a village now incorporated into New York City, in the Revolution the residence of many Loyalists. There is also a Greenwich Street in Hempstead, L.I., after which place our Hampstead was named. There seems to be no local tradition to explain the name.
- Guagus.**—Name of a lake emptying into the Lower North Branch of the Little Southwest Miramichi. It is also applied to a part of the outlet of Miramichi Lake and also to a place on the Renous River. It is without doubt Micmac, though I do not know its meaning. It seems to apply to a rocky place difficult of canoe navigation. Perhaps involves the same root as Naleguagus on Salmon River and Naraguagus in Maine.
- Ha Ha River.**—Still used. It occurs in the Calhoun Diary of 1771.
- Hamomashoe.**—Some place, not known to me, in Madawaska (Winslow Papers, 572).
- Hanwell.**—Used in the St. Andrews-Fredericton road survey of 1826-27, and said locally to have been named for an early family of residents of that name.
- Harcourt.**—P. 1826. Confirmation of the derivation here given is in Fullom's *Life of Sir Howard Douglas*, 266. He was a friend of Sir Howard.
- Hardwicke.**—P. 1851. So named, as I am told by Mr. D. Lewis, of Escuminac, for Mr. Benjamin Hardwick, of London, who became interested in Rev. James Hudson's Church of England missions here, and contributed to them; accordingly the parish was named for him at Mr. Hudson's suggestion, the final e being an error of the lawmakers.

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Hardwood Island.—Called *White Wood Island* in 1785 in the Land Memorials.

Hastings.—Named by Hon. A. R. McClelan in honour of Hastings Doyle, then Governor of the Province.

Hecklars Cove.—West of Jacquet River; mentioned by Cooney, 203; location and origin not known to me.

Hospital Island.—Fully explained in St. John *Sun* of Aug. 27, or 28, 1903. In 1848 the "Star" immigrant ship arrived with many immigrants to work on the new railway, and among these were many fever patients who died, and to the number of 48 were buried on this island.

Howard Settlement.—Former name of the present Canterbury Station; named no doubt in honour of Sir Howard Douglas.

Howardville.—Town laid out at mouth of Cains River in 1826, by order of Sir Howard Douglas, and, of course, named in honour of him.

Huskisson.—P. 1826. In honour of William Huskisson, in that year one of the plenipotentiaries (*Addington* being the other) to settle the disputed boundary question. No doubt it was hoped and expected they would secure a decision favourable to New Brunswick.

Indian Island.—Called *Fish Island* on the Morris map of 1765. Its early name *Perkins Island* was, no doubt, from that of the agent of the proprietors in whose grant it was included in 1765, Beamsley Perkins Glasier. (See Coll. N.B. Hist. Soc., II, 357).

Inglewood.—The origins of the many interesting names in this Manor are discussed fully in *Acadiensis*, III, 7.

Irish River.—This river is wrongly located on Loggie's and the Geological Survey maps, but is correct on Wilkinson, 1859. It is said locally, and no doubt correctly, to be so named for a former Irish immigrant settlement on its upper part.

Iroquois River.—First appears on the Sproule map of 1787 (see later Map No. 39) as *Oroquois*, which is probably a corruption of *Wolumkuas* (or *Aoulasqua*, as M. P. L. Mercure gives it to me) a Maliseet name, applied to it by Moses Greenleaf in 1823 and on maps of the time. The form *Iroquoiz* occurs in a document in 1836 in the Boundary blue-book of 1851, 13. It is locally pronounced not only Irockway, but also Rockway, and it appears thus in Loggie's map of 1898, and also in the newspapers.

Jacquet River.—Appears as Jacket in 1803 (Winslow Papers, 501), and the same in Land Memorials of 1806. I find the q first on Baillie's map of 1832 (*Jaquet*), while Wilkinson, 1859, appears to have introduced the present form.

Joes Point.—In the Boundary MS. the American agent in 1797, or about that year, speaks of the mouth of the Scoodic being at "the southwest point of Saint Andrews, or Joze's Patent." This suggests that it was for a grantee, and as Joseph Goreham was the first grantee of

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the land in this vicinity in 1767 it may be from his name. Or, it may be derived from Francis Joseph, a Passamaquoddy chief, prominent at the time of the Boundary discussion. Some confirmation for this is found in the fact that the point at St. Andrews nearest Navy Island was named *Louis* point, without much doubt for Louis Neptune, another prominent chief. (Coll. N.B. Hist. Soc., II, 184).

Jolicoeur.—As *Jollycoeur* in the Land Memorials of 1788, and as *Jolicoeur* in 1811. The *Richart* of Montresor is not this, but *Prée des Richards* (see later, under *Historic Sites* addenda). *Joliceur* is in Fisher's Sketches of 1825, 61. Jolicoeur seems to persist as the correct, or literary, form, while the local pronunciation is "Joliceur."

Jourimain.—A possible, though not very probable origin for this puzzling name is the following. A memoir written in 1749, by Father Germain, a priest in Acadia (for a copy of which I am indebted to Mr. P. P. Gaudet), suggests as the proper boundary of Acadia a line extending along the north shore of the Bay of Fundy, thence to Tantremar, and thence to Baie Verte, or possibly Cape Tormentine. It is barely possible that such a line was discussed in Acadia and known as the Germain line, in which case it is conceivable that his name became associated with the termination at the present Cape Jourimain, which is near Cape Tormentine. The chief confirmation for such a possibility is the fact that the name is locally pronounced *Germain*. But I must confess to little faith in this explanation. Germain seems to occur also as an Acadian name (*Acadiensis*, II, 103), and it may be that the islands at the cape may have been so named for an early resident, the present form representing a surveyor's attempt to give the word a French form. It occurs first as *Jcauriman Islands* in the Land Memorials of 1809.

Kagoot Mountain.—So named, a restoration of an Indian name, in 1903, as a substitute for Bald, or Big Bald, Mountain, as described in Bull. N. H. S., V, 215.

Kedgwick River.—This name appears in the documents connected with the Boundary Surveys of 1818. Thus, C. Campbell in his Diary of that year has invariably *Madam Kiswic* or Grand Fourche, which strongly suggests that the name is fundamentally the same as that of the Keswick (which see); Tiarks has *Memkesucc*, while the Tiarks and Burnham map has *Katawankisew*.

The Belle Kedgwick is, no doubt, properly *Bell Kedgwick*; the Final Report of the Graham Commission of 1842 shows that a Captain Bell surveyed the Green River in 1842, and crossed to this branch, and on Graham's map of 1843 showing these surveys it is called, apparently for the first time, *Bell Kedgwick*.

Kellys Creek.—A branch is apparently called *Chichawagaan* (see *University Monthly*, XIX, 4).

Kembles Manor.—Still locally called "The Manor." Origin and history fully given by Howe, in *N.B. Magazine*, I, 146.

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- Kent.**—P. 1827. Compare also Fisher's Sketches, 41. The "Kent" regiment is said locally to have been settled here in 1817,—compare *Military Settlements* in *Settlements Monograph*.
- Kent, County.**—Established 1826, and, of course, named in honour of H.R.H. the Duke of Kent, father of Queen Victoria.
- Keswick.**—As *Madame Keswick* on Sproule's map of 1787 (later, Map No. 38). Compare *Kedgwick*.
- Ketepec** (formerly *Sutton* on the C.P.R.).—Recent simplification of the Indian name of Grand Bay (see earlier in these addenda).
- Kewadu Lake.**—Appeared first on the geological survey map of 1887, placed there by Dr. Ells, who tells me he obtained it from a guide who had hunted much with the Indians. It is said locally to mean Indian Devil Lake; Dr. Ells' recollection is that he was told it meant Beaver Lake. No doubt it is Micmac, though I cannot trace it farther.
- Kilfoil.**—So named by the Post Office Department for a prominent resident.
- Kilmaquac.**—This name of the former Indian village of St. Croix, opposite Vanceboro, appears to survive in the *Kill-me-quick Rips*, at that place. (19th Rep. U. S. Geol. Survey, Vol. 4, page 49).
- Kilmarnock, Cove, C.**—Used in Acts of Assembly for 1830. Though not on maps, it is still in use. No doubt it originated with James Boyd, a well-known pre-Loyalist settler, who was connected with the Boyds of Kilmarnock, Scotland. (See *Courier Series*, XLI).
- Kingsclear.**—A local tradition asserts, as Dr. Raymond tells me, that this name originated from "King's clearings," applied in pre-Loyalist days to the open space left by the cutting of the King's pine-trees (which there were abundant) for the Royal Navy.
- Kingston, Kent.**—Changed in 1901 to *Rexton*, which see. Kingston was at one time known simply as "The Yard" (shipyard), but when Messrs. Holderness and Chilton, of Kingston, England, established a business there, the place was so named in compliment to them.
- Kouchibouguac, Kent.**—Several other early uses of this name that I have found begin with *Pi*: thus *Pichibouguack*, 1803 Land Memorials; *Pissabeguake*, 1803 (Winslow Papers, 499); *Passibiguac*, 1812, Land Memorials; *Pichibouguack*, plan of 1815. In one of his lectures on New Brunswick rivers, published in early newspapers, M. H. Perley derives this name from *Koohawaak*, meaning Cariboo plain.
- Labouchere Lake.**—It appears on the Land Company's plan of 1834. Labouchere was, in 1839, Under Secretary for War and the Colonies, and President of the Board of Trade, and very probably held some position in 1834 entitling him to this honour.
- La Coote, Lake and Stream, York.**—No doubt named for the Indian La Coote, who lived just above Vanceboro (see *Historic Sites*, 223, and *Acadiensis*, I, 195). On an old plan just at the outlet of this lake is placed *Ticket Madcoukai*, evidently an Indian word.

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La Coup Creek.—Locally called La Cook, but the French form is explained as meaning "a blow," because of the sharp turn it makes in entering the Aulac.

Lamec.—The preferable form of this name. See Alamec.

Lancaster.—P. 1786. Named for his former home in Lancaster, Massachusetts, by a prominent resident, Abijah Willard, as made plain by Gilbert Bent in *Acadiensis*, V, 162.

La Nef.—Compare the name applied by Champlain to Monhegan,—“We named the island La Nef, for at a distance it had the form of a ship” (Slafter, II, 91). It is possible that some confusion between these two *La Nef* localities led to some of the duplication noticeable on the Visscher and other maps of the time.

Le Nim, Point.—Locally pronounced La Nim or Le Nim. ‘On a plan of 1816 as *Point au Nim*. I am told by Mr. D. Ferguson, of Chatham, that the Indians call it *An-an-ink*, or *An-an-im-kik*, though Cooney’s meaning of a look-out place does not seem to him appropriate.

Lepreau River.—Called in the David Owen map and MS. *Minushadi* (possibly *Misuishadi*), no doubt an Indian name.

Lerwick.—Named for the native place of a group of Shetlanders, especially of a prominent one, Mr. Abernethy, who were brought out to work on the N. B. Railway, and settled here after its completion.

Letite.—Very possibly an Indian corruption *Petit*, i.e., Petit Passage; having labials they cannot pronounce the p, and the l would be a natural substitute. Still the evidence seems to favour a corruption of *La Tête*, applying to the great head on McMasters Island.

Lillooet.—Said locally to be so named by Senator King for a lumber centre on the Pacific Coast, visited by him or his brothers.

Lincoln.—P. 1786. The name is probably derived from the former home in Lincoln, Mass., of the Glasier family, among its first prominent settlers. Benjamin Glasier was a Lieutenant in a regiment in Lincoln, Mass.

Liverpool.—Named “in humble imitation of the Queen of the Mersey.” Cooney, 150.

Loch Lomond.—In this form in Land Memorials of 1812. Earlier called *9-Mile Lake*.

Loders Creek.—Simonds Creek on Sproule of 1786. (See also N. B. Magazine, II, 87).

Long Lake, Victoria.—Called by de Meulles, 1786, *P8chpem Kachk8echpa*, probably the same as the modern Indian *Quasquispac*. Gordon’s *Pechayzo* is very likely an error, really applying to Trowsers Lake (i.e., *Belchesog*, the Indianized Trowsers, or Breeches, Lake. See Bull. N. H. S., IV, 327.

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- Long Lookum.**—Name of long straight stretches of river on the St. Croix, Nepisiguit and Upsalquitch, no doubt a hybrid Indian-English expression.
- Louison.**—I have found several references to the use of this name for Indians. Thus the Journal of the Survey of the North line in 1819 shows an Indian helper named Louison.
- Ludlow.**—P. 1814. Named no doubt in memory of the brothers, Gabriel G. Ludlow, Administrator of the Province in 1803, and George D., Chief Justice of the Province, both of whom died in 1808.
- Lumsden, in Albert.**—Named, as I am told by Hon. A. R. McClelan, in honour of a man with whom negotiations were carried on to bring out settlers to the Province.
- Lynnfield.**—Said locally to be so named from the hymn-tune of that name, a great favourite of one of the earliest settlers.
- Maces Bay.**—On Sproule, 1786, as *Mac's Bay*. The origin of this name still eludes me, though I am inclined to believe it is from the Indian Mechescor. It is barely possible it was given by DesBarres. He named many places for contemporary British officers, and there was a Benj. Mace, a surgeon in the 22nd Regiment, serving about that time in America.
- Mactaquac.**—*Mactaguack* on Sproule's map of 1786, and as *Mactuquac* in the Land Memorials of 1786.
- Magaguadavic.**—This is the standard spelling of this word, though its pronunciation is invariably "Macadavy." The retention of the longer spelling is no doubt connected with the constant official use of the longer form through the many documents and maps of the Boundary disputes, as shown in the Monograph on Boundaries, 277.
- Magundy.**—I think, without doubt, of Maliseet Indian origin. Apparently an early Indian portage to the Magaguadavic Lakes passed by way of this stream (see later in these Addenda under "portages"). Very likely it is the same word as appears in Magundicook and possibly Mooselemeguntic in Maine, and, perhaps, related to Slugundy, which see. This origin is confirmed by the form *Magundic Ridge*, 1823, in the Land Memorials, and by the local tradition, which also makes it of Indian origin.
- Mainor Lake.**—On Loggie's and Geological Survey maps for a branch of the Little Southwest Miramichi. An interesting example of the errors that can arise simply mechanically through misprints, etc., for locally the stream is called *Mains*, or *the Lake, Branch*.
- Mahood Lakes.**—A name introduced in 1898 for a group of lakes in Charlotte County, in honour of William Mahood, a prominent early surveyor of the County, and first surveyor of that group. The name, with those of other lakes of the group are explained in the Bull. N. H. S., IV, 57.

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Mal Baie.—See Miscou.

Malcontentes, Ruisseau des.—A small stream emptying into Cocagne Harbour south of Dixon Point, so named, as I am informed by M. Gaudet, because a group of expelled Acadians settled there for a time after the expulsion.

Malpec.—Name of a small brook east of Neguac. Said by Chas. Bernard, Indian teacher at Church Point, to be in Micmac *Malbek*, 'meaning "water is low." Pronounced locally Mawl-pec.

Maltampec.—This name, though thus pronounced in local use, is misprinted on all printed maps, as Mattampec, though it is correctly written on plans in the Crown Land Office. It is undoubtedly Micmac, though I do not know its meaning. On the Ferguson map of 1811 it is written *Ranamagauch*, apparently another Micmac name.

Mahalawodiack River.—Very little known locally (called Little River, or Little Buctouche), except to local antiquarians; it seems to be known to them (Gaudet and Father Michaud) as Madagouiac.

Mamozekel.—First on Garden's plan of 1835 as *Mammyzekel*. I am told by Mr. M. Hardy, of Brewer, Me., that he was on the Tobique in 1858, and that the Indians give him the name as Ebemeenarzekel; ebemenar, meaning red berries like mountain cranberries, thus would agree to some extent with my Indian informant who gave it as "bushy stream." The name is also applied to Britt Brook, a branch of Serpentine, the latter, indeed, seeming to be the main He-be-se-kel, and the Mamozekel being *He-be-se-kel-sis*, the little Hebezekel, though a much larger stream than the former.

Manne, Rivière de.—River flowing into Miramichi in the Acadian Period mentioned by St. Valier in 1688; probably Burnt Church River.

Maquapit.—The Indians agree that it is from the word Maqua = red. Rev. R. W. Colston has written me the explanation which is, no doubt, correct. He says there is much red gravel along its shores, and that after heavy rains much red mud is carried into the lake. I find it in 1785 as *Maquapee* in the Land Memorials. But it is not the R. de Maquo of 1672, as later shown under Seigniories in Historic Sites addenda.

Marcelle, Pointe.—Said locally, and no doubt correctly, to be so named for a former resident, Marcelle Le Clair.

Mark Island (also called Pope's Folly, which see).—So named, no doubt, because serving as a mark in the navigation of the West Passage.

Maringouin Cape.—Locally commonly called Merry Magwin. There is a local tradition that it was so called because a prisoner was once exposed there to be bitten to death by mosquitoes. This is probably only a legend, which has arisen to explain the name.

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- Marischal Keith.**—Name of a barony established in 1625 by Sir William Alexander, granted to Lord Keith and Altrie, on the east side of the entrance to River St. Croix, hence covering the site of St. Andrews. (Slafter's Sir William Alexander, 51).
- Marsh Creek, St. John.**—On this and its Indian name, see N. B. Magazine, I, 8, and III, 1.
- Martin Head.**—It occurs as *Martin's Head* in the Land Memorials of 1785, and again in 1786, and hence this, and not St. Martin's Head, appears to be the earlier form. I have, however, found no clue to its origin, unless there may be some connection with one James Martin, who had a grant in the Orange Ranger tract at Quaco in 1783. Some adventure of this man at that place might readily give his name to it. Locally it is called *Martin Head*, rather than *Martin's Head*, which form accordingly I have adopted.
- Martinon** (formerly *French's* on the C.P.R.).—A recent simplification of the old French name of a Seigniory at St. John. (See earlier in these Addenda).
- Marys Point, Shepody.**—I am in error in stating it is locally said to be properly St. Mary's Point. It is said locally that it was for a squaw of that name (Mary), and one old and well informed resident told me that it was early called *La Pointe de Marie Bidoque*. I have no doubt this explanation is in essence correct.
- Mascabin.**—Some confirmation of my surmise that it is simply a chart error for Mascarin (Mascareen) is found in Hind's use of the word in his Report on N. B. Geology, 136.
- Maugerville.**—The real genesis of the name is given in Fisher's Sketches, of 1825, 103, and is traced by Raymond in his St. John River, 155, and Coll. N. B. Hist. Soc., II, 294, 323, who shows that it was temporarily called Peabody from a prominent resident. Had it not been for Joshua Mauger it is very probable the settlers would have obtained no grant of their lands, and hence the naming of the important township for him was natural and appropriate.
- Maxwell.**—Former name of a settlement made on Eel River in 1842 (see Settlements Monograph). It was probably named for Lieut.-Col. A. M. Maxwell of the 36th Regiment, the commander of the N. B. soldiers in the "Aroostook War." He returned to England in 1840 with the esteem of the people of New Brunswick.
- McAdam.**—The present site of the Junction was about 1850 called *City Camp*, because of the large number of lumber camps then in the immediate vicinity, as I am told by Mr. A. M. Hill. When railway construction (i.e., the eastern extension between Vanceboro and St. John) began in 1869, the place bore this name for a time. But a watering station established two miles up the line on McAdam Brook (so named be-

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cause lumbered by John McAdam) became known as McAdam, and the name gradually was transferred to the Junction, the watering place being later named Maudsley (for a British capitalist interested in the road). Thus the name gradually became applied to the junction and was afterwards extended to the parish. This is probably strictly correct, and it is wholly in conformity with the method by which place-names arise.

Medisco.—A point at Petit Rocher, according to Perley, Fisheries of N. B., 45; one of Gaudet's articles speaks of "Petit Rocher, autrement dite Madisco."

Meductic.—This name is now applied to the modern village just south of the mouth of Eel River.

Meductic Falls.—On the Peachey type of maps there occurs here a *Gath of Medoctu*, long a puzzle to me. On a recently obtained copy of that map, drawn by Sproule (mentioned later in Cartography addenda), I find it written Gall of Medoctu, which, I have no question, is a copyist's error for Fall—showing that Gath is an error for Fall or Falls.

Memel, in Albert.—Named by a German settler from that place in Germany, as I am told by Hon. A. R. McClelan.

Messinet Stream.—Named, no doubt, from some one of the family of a French physician of that name who settled in St. George, and whose descendants are still there, as I am told by Mr. J. Vroom. At one time I thought this word a corruption of an Indian name given in the Land Memorials of 1797, which speaks of a stream in Pennfield parish called *Wascaswinwick*, the identity of which is not known to me.

Middle Island.—The original grant of 1765 speaks of Middle Island lying off Windmill Point. (Compare *Nuncheal*, later).

Middle River.—This appears to have been called by Plessis in 1811 *La Rivière du Mitau* (Journal, 114), though Mitau is, perhaps, a misprint for *Milieu*.

Midgic, Westmorland.—Appears first, so far as I have found, in the Land Memorials of 1812 as *Point Medjeck*, though it must have been used much earlier.

Milnagek Lake, or Island Lake.—The name and the local nomenclature of the vicinity is fully discussed in Bull. N.H.S., IV, 469.

Milpagos.—Compare Rand's *Milpaachk*, "having many coves" (Reader, 100). and *Milpagech*, variegated (101).

Minaqua.—See Northwest Miramichi.

Miramichi.—The origin of this name still eludes me. Its first use in a modern form is as *Mesamichi* in deMonts' Commission of 1603. To the various fanciful explanations of it may be added that of M'Gre-

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gor (British America, II, 260), who makes it, "a probable corruption of Miracheet, a tribe of Micmacs once inhabiting its banks," but he evidently here has in mind the Maliseets, sometimes called Mariseets. The meaning "Happy Retreat," first given by Cooney and widely accepted, is of no value whatever, since the same meaning is given in an old document as applying to the Nepisiguit (Coll. N.B. Hist. Soc., II, 128). On the map in the Micmac Almanac for 1902, published by Rev. Father Pacifique, the word appears in the form *Malimeoisitg*, and he writes me that this is the name applied to the peninsula where Chatham stands, and it can mean "Place where one collects diverse kinds of berries." But, he adds, that he does not know whether this is an aboriginal word, or simply a Micmac pronunciation of a word derived from the whites.

Miscou.—The suggestion in Place-Nomenclature (page 253) that this name may be derived from an Algonquin word meaning red, "describing the low red cliffs about it," proves groundless, since, as I have found by personal observation, no such cliffs exist. I find the local tradition among the best-informed local residents makes the word Indian, meaning "low land" or, as one told me, "boggy land." This interpretation I find confirmed by Joe Prisk, the intelligent old Micmac of Bathurst, who told me he thinks the word is Micmac, and means "muddy land," having in it the root *susqu*, meaning "mud," in which case the aboriginal form (which the Micmacs appear to have quite lost) would have been something like *M'susqu*, easily shortened to Miscou. I take it that the word means not only mud in our sense, but also muck, marsh, wet bog. In this case it forms an admirable descriptive name, for the most striking fact about the physical geography of Miscou is the prevalence there of open bogs or barrens (copiously covered with boggy lakes), which, indeed, form over one-half of the surface of the island (compare the map and description in Bulletin of the Nat. Hist. Soc. of N.B., V, 449). The name Miscou seems to occur for the first time in Champlain's Narratives, under the year 1623.

The local and historical nomenclature is of much interest. No Indian names, except *Miscou* itself, have survived, but many French names are in use. The name *Isle de Saint Louis* is applied to it in the Jesuit Relations, and *Cap de l'Espérance* was given to its northern point by Cartier in 1534 because in rounding it he hoped he had found in Bay Chaleur the western passage. *I. à Monsieur* is applied upon old maps to a small island in this vicinity which I think can be only Money Island, the only one hereabouts which is striking enough to be named on the old maps. The name *Money Island* (called by the French *Isle au Trésor*) is, of course, descriptive of the supposed treasure there (see later, under Historic Sites). *Pointe au Vable* and *Boullin des Boeufs* occur upon West's original map of the island in 1820, and both names are still known to the older residents, though not now in actual use; *Vable*, I presume, is connected in some way with *Sable*, sand, while *Boullin des Boeufs* (spelled *Bouillin des Boufs* on West's map) was explained to me, and I have no question, correctly, by

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Mr. Andrew Wilson, as applying formerly to the fine birch woods where the lighthouse now stands, in which the cattle of the settlers formerly wandered; the word is an Acadian *mélange*, meaning "the birch (grove) of the cattle." *Mal Baie*, in common use, probably is a corruption of "Morue Bay," or "Cod Bay," a name occurring elsewhere in Acadia, and alludes to the cod which have appeared there frequently and have been left stranded at low tide. On the different maps the names *big* and *little* are applied to them, but with no constancy, and sometimes transposed, but they are not used locally. The term *Queue*, meaning of course "a tail," is in constant local use for the two narrow-necked bays as shown on the map, but the word does not occur elsewhere in the Province so far as I know. *Lake Chenire* is said locally to mean "Oak Lake" (obviously including the root *chêne*), though the word Chenire is not used now in Acadian; the name is known by the older residents to have been given when oak staves were made in the woods on its southern shore. *Grande Plaine* is descriptive of the great beach-plain here built up by the sea (as described in the paper above cited in Bulletin of the N. B. Nat. Hist. Soc.). *Lac Frye* is so named, without doubt, for the Canadian who had a fishing establishment here in 1775 (Canadian Archives, 1894, 331). *Munroe Lake*, on old maps applied to Lac Frye, but now used for the little lake near the lighthouse, is said to be for another early fisherman. *Landry River* is for the early settler of that name, afterwards one of the founders of Upper Caraquet. All of the other names on the map are obviously descriptive, either of physical peculiarities, ownership, etc. *Black Point* (*Pointe Noire* by the French) still in use by older people, applies not so much to the outer point at Wilson's as to the settlement, and probably was originally applied inside the harbour.

One series of the descriptive names, those applied to the smaller lakes, have been mostly given by Dr. J. Orne Green, of Boston, (a sportsman who has camped on the island in autumn for some twenty-eight years past) and for various reasons descriptive of physical peculiarities or commemorative of some of his friends or guides who have been with him there. The maps and charts commonly apply the name *Miscou Point*, or *Point Miscou* to the extreme northern point of the island, but this is not the local usage, which calls the northern end *Northwest Point*, and applies *Point Miscou*, or, more commonly, *Miscou Point* to the vicinity of the lighthouse, a usage which is, at least, as old as 1832 (Cooney, 177). The settlement near the lighthouse is called *Miscou Point Settlement*, with a strong tendency to shorten it simply to *Miscou Settlement*, or even simply to *Miscou*. On the charts occur the names *Mya Point*, *South Mya Point*, *Pecten Point* and *Pandora Point* (the former being the scientific names of the clam and the scallop respectively), given, no doubt, by the officers of the Admiralty Survey in 1838, but they have never come into use and are entirely unknown locally. All of the Miscou local names may be found upon an Historical Map, accompanying my paper, "The History of Miscou," in *Acadiensis*, Vol. VI.

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Missaguash.—The best form of this diversely-spelled word.

Mistake Creek.—Was earlier called Coy's (not McCoy's) Mistake (Raymond, St. John River, 327). Early grants appear to refer to a Mistake Creek on the Kennebecasis.

Mistouche (or Tracy's) Brook.—On the curious nomenclatorial history of this name, see Monograph on Boundaries, 407.

Monash Cove.—Presumably Micmac, but origin not known to me.

Moncton, (now Gibson).—See a note on this name in N. B. Magazine, I, 71.

Money Cove, Grand Manan.—For the supposed presence of buried treasure, as explained fully in Perley, Report on Fisheries, 103.

Monument Brook.—In Maliseet *Titiakmige*, meaning low-ground throughout. (Gatschet, Eastport *Sentinel*, Sept. 15, 1897).

Moorefields.—Important early settlement on the North shore of the Miramichi, since the great fire of 1825 included in Douglastown.

Moreau, Pointe à.—Said locally to be so named for a former resident.

Mosquito Cove, near St. John.—Used in the Morris Report of 1765.

Musquash Harbour.—Compare *Frenchman's Creek* earlier. The legend mentioned here is given in full in Leland and Prince, Kuloscaph the Master, 26.

Nabouiane.—A place near Shediac, mentioned by Bellin in his Description of 1755, page 31; identity unknown to me.

Nackawic.—A branch of this river appears to bear the name, doubtless Indian, *Naraguisis* (see Select Committee Report of 1861, 17, 70). Possibly connected with *Naraguagus* (Naleguagus, which see).

Naleguagus.—Name, still used, of a rapid on Salmon River, Queens County (above Castaway Brook); it is, no doubt, Indian and by the same origin as *Narraguagus*, in Maine, and connected with *Guagus*, which see.

Nantucket.—Perhaps connected with the Captain Folger, of Nantucket, Mass., who was at Passamaquoddy after whales in the eighteenth century (Kilby, Eastport and Passamaquoddy, 105).

Negoot.—Name proposed in 1901 for the group of lakes on the right hand branch of Tobique, a restoration of the Maliseet name of the river (see Tobique). It, together with all the local names of the vicinity are fully discussed in the Bull. N. H. S., IV, 326, 337; V, 67.

Nepisiguit.—The origin of the nomenclature of the hills at the head of the river is discussed in Bull N. H. S., IV, 251, and of its south branch in the same Bulletin, V, 226.

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New Brunswick.—The earliest use I have found of this name is of date May 29, 1784, a document in Archives Report for 1894, 419. On other proposed names see Raymond in N.B. Magazine, III, 44; Canadian History Readings, II, 52; Canadian Archives, 1894, 418; Winslow Papers, 174. In earlier records and maps it appears very frequently as New-Brunswick. A frequent local pronunciation is Noo-Brumsick.

New Horton.—Settled by people from Horton, in Nova Scotia, whence the name, as I am informed by Hon. A. R. McClelan. This is confirmed by a statement in Johnston's North America, II, 112.

New Mills.—The former name, *Malagash*, occurs in the Land Memorials of 1789; and in 1814 in Winslow Papers, 689.

New River.—On Sproule's map of 1786.

Nictor Lake.—The origin of this name, and of the other local names, including mountains, of the vicinity is discussed in Bull. N. H. S., IV, 240.

Nigadoo.—In this form in 1807 in the Land Memorials.

Northumberland Strait.—The name *Red Sea* applied to its southern end on some maps was given, according to MS. Owen Journal of 1767 (which I have seen), "called by the French *La Mer Rouge* or Red Sea, probably because of the colour given by the soil of St. John's Island to the water."

North Pole Branch.—Its nomenclature is fully described in Bull. N. H. S., V, 468.

Northwest Miramichi.—Locally always pronounced *Norwest*. The Indian name of this river is Elmunakun, (*Atlee-ma-nagan*, M'Gregor, British America, II, 260, and *Menail-menaagun*, E. Jack in MS.). Rand gives the form *Elmunakunchcech*, meaning a "beaver's hole," for the Little Sevogle, though I think it likely he was misled by the diminutive *cheech*, and that really it applies to the Big Sevogle (see Sevogle). In his dictionary (133) he gives Elmunakun as a beaver's or muskrat's hole. As to why such a name is applied to the Northwest I think it very probable that it was descriptive of the occurrence at the place now called Big Hole of a remarkable cave (suggesting a beaver's or muskrat's hole), mentioned by Professor Bailey in Bulletin of the Natural History Society of New Brunswick, V, 158. The very name, Big Hole, is some confirmation of this supposition. Rev Father Pacifique, however, derives it from a word meaning silent, which is not appropriate.

For this river the French maps used the contraction *Minaqua*; and I have proposed recently (Bulletin of the Natural History Society of New Brunswick, Vol. V, page 431) to restore this name as a convenient designation for scientific purposes for the north and south part of the valley of the Northwest. The Indian name occurs first in a document of 1686 (mentioned later under "Settlement of Richard Denys"), as *Mumunagan*.

The local nomenclature of the headwaters of this river is discussed in Bull. N. H. S., V, 227.

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Norton.—P. 1795. As to this name the late Leonard Allison wrote me as follows:—"I have for a good while supposed, though I have no direct evidence of the fact, that the Parish of Norton, in Kings County, was named by the Honorable George Leonard, as the habitat of his branch of the Leonard family seemed to be Norton, Mass., as appears from W. R. Deane's Memoir of the Taunton Leonards (Boston, 1851), page 8, from which it appeared that his grandfather, Major George Leonard, removed in 1690 to Norton, then a part of Taunton The Honorable George Leonard's father, the Reverend Nathaniel Leonard, was born at Norton." This explanation is entirely in harmony with the mode of naming of many other parishes in the Province, and is probably correct. It may be that the Norton Brook, in Sussex, east of the parish may have some connection with the name, or it may be a coincidence.

Nova Scotia.—The very interesting genesis of this name with the curious reason for its persistence in the Latin form, is fully discussed in the Educational Review, XVI, 11, and in the Boundaries Monograph, 213.

Numeheal Creek.—According to Raymond (N. B. Magazine, II, 217) this was the Pre-Loyalist name of a creek "opposite Middle Island in Mauger-ville." I believe, however, that this is simply a bad misprint for Windmill Creek (now called Street's Creek?), for there was apparently a Windmill Point just beside it (see Middle Island).

Oanwells Island (of the Peachey maps).—Granted as *Fall Island* in 1785 to Capt. Atwood (Land Memorials). Just below it is *Belvisor Bar* (which see), and it is called Belviso Fall Island in a document of 1810, and also Cronkite Island, according to Raymond (letter). Now called Brown's Island.

Ohio Settlement.—Origin locally unknown. Johnston (Travels in North America, II, 62) speaks of it in 1849 as a new French settlement. I think it very likely that this settlement, as well as the several California Settlements in the Province, were named when emigration to those places was attracting much attention, in a half-humourous allusion to them as possible substitutes. Johnston, in his Travels in North America, II, 39, comments upon the "emigration fevers" which swept over the country at intervals, and adds: "These accessions of fever come on at irregular intervals. The Indiana, the Illinois, the Michigan, and the Wisconsin fevers have all had their turn, and now the California paroxysm is at its height."

Old Mission Point.—The Micmac name of this point, as I am told by Mr. D. Ferguson, of Chatham, who knows the place and Indians well, was *Chec-gook*.

Onlockywicket.—Name of a place on the Upper Nepisiguit, in local use by guides and lumbermen, doubtless Micmac.

Ononette.—(Formerly *Riverbank*, on the C.P.R.). Recent simplification of the Acadian name of Brandy Point (see earlier in these addenda).

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Ormond Lake.—In 1837, the year this name was given, the Marquess of Ormonde had his seat at Kilkenny Castle, Ireland, and very likely, as Chief Butler of Ireland, he had some part in the coronation of Queen Victoria in that year, thus leading Mahood to connect his name with that of Victoria and Adelaide. The late J. Allan Jack was of opinion, however, as expressed in letters to me, that it was named for Col. Ormond, of whom there is a full account in *Acadiensis*, II, 19.

Oromocto Lake.—For a discussion of this name, and of the various local names around the Northwest Lake, see *Bull. N.H.S.*, V, 193.

Osnaburg.—A temporary name for Fredericton, used as early as Oct. 20, 1784 (as shown by a petition of that date still extant), and used occasionally even after the name Fredericton was given in 1785. The name was for the same prince for whom Fredericton was named, Frederick, Duke of York, Bishop of Osnaburg.

Pabineau.—The origin of this name, from the Acadian name of the high-bush cranberry, is fully discussed in *Acadiensis*, I, 88.

Palfrey Lake.—Playford's plan of Survey around Howard Settlement, 1833, has Palphry Brook, and possibly the name was given by him, and the St. Andrews and Quebec Railway Survey, 1836, has the Palfrey Mountains. I am told, however, by Mr. John Stewart, who knew this country well, that it was so called for an old trapper of that name, while Mr. W. H. Venning tells me he remembers hearing, many years ago, that it was so named for the first man to cut a saw log on it. Inquiries at Vanceboro, made of old residents for me by Dr. Young, have failed to yield further information about such a person, though it is very likely the lake and stream were named for some early hunter or lumberman, or, very likely, for an Indian resident or hunter.

Palmerston.—Has vanished entirely, both the parish and settlement being now called St. Louis de Kent.

Pamdenec.—(Formerly Hillside, on the C.P.R.). Recent Maliseet name, meaning a little hill (see earlier in these addenda).

Pamomkeag.—(Formerly Nases, on the C.P.R.). Recent Maliseet name, meaning river beach (see earlier in these addenda).

Passamaquoddy Bay.—This word is fully analyzed by Prince, in *Proc. Am. Phil. Soc.*, XXXVIII, 181; also in Leland and Prince, *Kuloseap the Master*, 23. In the Jesuit Relation of 1675-77 (*Relations*, LX, 262) it occurs as *pessemouquote* or *pertemagouate*, which latter form is both the earliest known and also very near to the aboriginal form. The earliest use of the modern form appears in the account of Prince's voyage in 1734 (*N.E. Hist. Gen. Reg.*, V, 376) as *Pessamequoddy*.

The Boundary MS. contain abundant testimony as to the exact location of the name, from which it is plain that originally it did not apply to the spacious bay now having that name, but to the region between Deer Island, Campobello, and the American shore, from Head Harbor to the Cobscook (see *Monograph on Boundaries*, 277). This

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is the region 'still called *Quoddy* by the fishermen and other local navigators, who call the Bay of Passamaquoddy of our maps St. Andrews Bay. In the Boundary MS. it is said that pollock are not taken in the inner bay though abundant in the outer, which (if correct) is strong confirmation of this use of the word, since Passamaquoddy unquestionably means *the place of pollock*.

Paticake Brook.—As *Patticake Creek*, in Sproule's Map of 1786.

Paunchy Lake.—A small lake near Midgie, Westmorland, probably of Micmac Indian origin. Pronounced locally like Pawn-che. (It is shown on a map of the region in the Botanical Gazette, XXXVI, 164).

Pays Bas.—A name used by the Acadians of Madawaska for the lower part of the St. John, French Village and downwards, as I am informed by M. P. L. Mercure.

Pekonk Hill.—Just on the New Brunswick-Maine boundary west of Rapide de Femme. It is often mentioned in documents connected with the boundary surveys, and is on some of the boundary maps.

Pelerin.—A settlement in Kent, named for a family of Acadians of that name, as I find by local inquiry. The name has been wonderfully corrupted on different maps into Pulrang (Loggie, 1884), Pellering (on Postal Map), etc.

Peltoma.—A chief named Piere Toma is mentioned in Kidder's Revolutionary Operations, 105.

Pemwit Branch (of Green River).—Said locally to be so named for an Indian who hunted there.

Perth.—P. 1833. Named, in all probability, in honour of Sir Archibald Campbell, then Governor of New Brunswick, whose birthplace and home seat were in Perthshire, Scotland, though locally said to have been named by patriotic Scotch residents for the place in Scotland.

Petitcodiac.—Occurs first on de Meulles map of 1686 as *Petcoucoyek*.

Petit Rocher, not **Petite Roche**.—It occurs thus in Plessis in 1811 (116).

Philmonro.—So named for a resident of that name (it is said locally), printed on some maps as *Filomaro*.

Pikwaket.—The best spelling for this variously-spelled name.

Pirate Brook Lake, York.—On an old plan the lake is called *Scooneygomskiktie*, no doubt its Passamaquoddy name.

Pisiguit.—Nothing to do with *Cowassaget*, which see.

Piskahegan.—On Sproule's map of 1786, where it is called also Grand Fork, perhaps a translation of its Indian name.

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Point de Bute.—Occurs as Point Debuté in Fisher's Sketches of 1825, 61; and apparently in a document of 1788 mentioned by Trueman; also in its present form in the Willard Diary of 1755 in possession of the Lancaster (Mass.) Public Library.

Pokesuedie Island.—As *Pocsuedier I* on a plan of 1816. It is Little Pokesuedie Island, locally *L'Ilet*, which is *I à Zacharie* on old Indian plans. Pronounced locally Poke-su-die (the u as in duke, and accent on the second syllable).

Pokemouche.—In the Crown Land Office is a large-scale plan entitled, "Sketch of the Upper Parts of the River Pocmouch," by William Ferguson, 1811, which gives a number of Indian names as follows:—*Pidpudmoe* Brook, the present Caribou Creek; *Waganchitch* Brook, the present Peter's Brook; *Chicichichoc* Rivulet, the present Pelletier Brook (on the south side above Peter's Brook); *Ranamagauch* Brook, the present Maltempec. This map will be reproduced in my article upon "The History of Pokemouche," in *Acadiensis*, Vol. VI.

This map also applies the *Pte. de la Croix* to two points, the northern one at Upper Pokemouche (opposite Rivers Point), and that between Maltempec and the main Pokemouche. Presumably these mark the sites of Indian burial grounds.

The Micmac name of Trout Brook on the Upper Pokemouche (8 or 9 miles above head of tide on N. side) has been given me by the intelligent old Micmac, Joe Prisk, of Bathurst, as *Mat-wes-ka-be-jeechk*, meaning "porcupine was hanging."

Pokomoonshine Brook.—This name occurs also in Piscataquis County, Maine, and also in the Adirondacks (see Forest and Stream, May 18, 1901, 384, and the same, June 22, 1901). It is, no doubt, of Indian origin, but the aboriginal form and meaning seem unknown.

Pollet River.—Occurs as *Paulets River* in Land Memorials of 1791.

Ponwauk.—The deadwater on the St. Croix, from below King Brook to Kendrick's Rips, above Chepedneck Falls. Said by the Indians to mean "place of quiet water," as I am told by Mr. Irving Todd, who knows the place well. Perhaps the word has some relation with Penniac.

Poodiac.—A Post-office in Kings County; name of imported Indian origin. Its origin has been explained to me, and I have no doubt, correctly, by a resident, Mr. S. H. F. Sherwood, who wrote me that it was suggested by Poodic, a suburb of Portland, Maine. Asked for more detailed information, he wrote me as follows: "The office was established over 30 years ago. At that time we sent several names that we considered decent, but each was rejected at Ottawa as being already the name of an office in the Dominion, and we became discouraged. About that time there was a young lady visiting here who had been in Portland. She said the people there had a habit when anything annoyed them of wishing it 'tother side of Poodic.' She had also acquired the phrase. She suggested that we call the office

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'Poodic,' and, half in jest, this name was forwarded. In due time the office material arrived and on the stamp was Poodiac. Why the Post Office authorities inserted the a I never knew." This explanation is sustained by the fact that Poodic, from the Indian Purpooduck, is a suburb south of Portland, Maine, on the north shore of Cape Elizabeth. This name is of especial interest as illustrating well the extremely trivial origin of many place-names.

Popelogan, C.—As *Pokee Login* Bay and *Poughelagen* Bay in Land Memorials of 1785 and 1786; *Pocologin* Stream on Sproule's map of 1786; *Popologan*, 1815, in Land Memorials. The name is, no doubt, connected with *ogan* and *bogan* used for quiet coves beside a river in Maine and New Brunswick. The word is discussed by Tooker in the *American Anthropologist*, I, 165.

Popes Folly.—Two islands at Passamaquoddy have borne this name. One (now commonly called *Mark* Island, which see, close to Campobello) was named, no doubt, because of some connection with Zeba Pope, who lived there in 1808 (see Monograph on Boundaries, 359). The other, between Indian Island and Casco Bay Island, was, perhaps, named for the same man. Lorimer says that on this island (Passamaquoddy Islands, 95) "poor Pope, in 1812, established a trading post and lost all." This name *Folly* is not uncommonly applied to unsuccessful business ventures by neighbours, who are always wiser after than before an event, and it appears elsewhere in *Clinch's Folly* (on the charts for an island near Letang) and *Folly Point*, in Westmorland.

Portobello.—One of our still unexplained names. Portobello, in South America, was captured by Admiral Vernon in 1739, and I have been told that there were formerly residents of Maugerville of this name; probably this is only a coincidence, but there may be a cause and effect connection. It is locally explained, as given earlier, in these addenda.

Dr. Raymond has suggested that the name may have been given for some connection with Capt. William Spry, who had large grants in this vicinity in pre-Loyalist times, and who may have been at the taking of Porto-Bello in South America.

Quaco.—An old plan in the Crown Land Office has this inscription, north of the present Quaco Head,—"*Oreequaco*, so called, a point of rock resembling a human head and neck," while another reads, "High Point of Rock resembling the profile of a human head and neck, called by the Indians "*Oreequacco*." The origin of the name is discussed in Bull. N.H.S., IV, 72. Locally explained as noted earlier, in these addenda.

Quisibis.—On the Sproule map of 1787 (Map No. 39, later) as *Squisibis*.

Renforth.—Named by summer residents in Oct., 1903, in honour of the English oarsman of that name, who died in a race on the Kennebecasis many years ago; earlier called *The Chalet*.

Renous River.—Its nomenclature is discussed in Bull. N.H.S., V, 311. It appears first as *River Renou* in the Land Memorials of 1808.

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Restigouche River.—The original plan of the river, of 1836, explains the origin of some of the names of its branches. Thus, the present Boston Brook is called Beaver Brook, and just at its mouth is a lumber camp with the name *New Boston*, no doubt a facetious name for the place; evidently Boston became extended to the stream and is now its name. On Jardine's Brook, William Jardine had a timber license in 1837. The reason for the name *Five-finger Brook* is given on MacDonald's map of his line of exploration from the Upsalquitch to the St. John, for that line crossed four branches of the stream radiating from near one another near its head, a feature shown on none of our existent maps.

The Indian name of this river is, I believe, the same fundamentally as that of the *Aroostook*, which see.

Rev. Father Pacifique, of Mission Point, writes me that he thinks it altogether probable the word Restigouche is derived from *Elistegei*, meaning to resist, to revolt, to struggle, which suggests one of the meanings commonly given, namely, "river of the long war."

Rexton, Kent Co.—Formerly called Kingston. The genesis of the new name is given in a letter from Dr. J. W. Doherty of that place, dated May 9, 1901. After relating the inconvenience of the former name, owing to the many duplications in Canada, he says:—"In consequence, I started a petition among the residents of this place for signature with a brief list of names appended to be voted upon, being careful that no name so voted on should be a duplicate of any other name in the Dominion. My choice of Rexton appeared to take the fancy of those signing and, in consequence, no general meeting of the inhabitants was thought necessary for the purpose of ratifying the change of name, or the name so voted on. The petition was then sent to our representative (O. J. LeBlanc), who presented it, with a strong recommendation, to the Government (Postmaster General) and, in consequence, the name of Kingston, Kent, was changed to Rexton, Kent." The change went into effect May 1, 1901. Of course the *Rex* is the Latin equivalent of *Kings*, making the name a Latin-English hybrid, but, perhaps, none the worse for that.

It is of interest to note that Kent County has been the scene of more changing of names, and by official procedure, than any other County of the Province, for, in addition to the above mentioned change, Palmerston has been changed to St. Louis, Liverpool to Richibucto, and the railroad station at first called Weldford was later changed to Harcourt.

Richibucto.—From the teacher of the Indian School at Big Cove, Miss Mary Isaacs, herself a Micmac, from Restigouche, I have received the following as the Indian names of places on Richibucto and vicinity:—Richibucto, *Itseebooktook*; Molus River, *Seegudecascook*; St. Nicholas River, *Helknowkon*; Bass River, *Boksnok*; Big Cove, *Melicksnadec*; Indian Island, *Lluo Mayneegoo*, which, however, seems to be merely the translation of the English name into Indian.

Of other local names on Richibucto, most are self explanatory, being descriptive or for residents or owners. *Platt's Point*, just below

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the marine hospital, probably is named from an early Acadian, Jos. Richard, dit *des Plattes*, though his connection with the place is not known. In the Land Memorials of 1822 I find mention of *Marin Island* and *River Ro* (near the Forks), both of which seem now unknown.

Richmond.—Another possible explanation of this name is given by Raymond, in his History of Carleton County, 75th article, when he states that some of the early settlers were from Richmond, N.Y.

Rivière du Cache.—The preferable form of this name. An additional note of importance on the origin of this name is in the Historic Sites Monograph, 293.

Rocher, or Rosher.—A form of *Roshea*, which see.

Rockwell Stream.—For a grantee, not the stream of that name in Ireland.

Rollingdam.—It is mentioned in an Act of 1832 (Acts, page 563). The description given in the Place-nomenclature is not exact; it is a dam built on a sandy bottom, and having a slope down as well as up stream in order to prevent it being undermined by the fall.

Rooskey Lake.—No doubt named by Mahood for one of the five lakes of that name in Ireland. The name is not locally in use; it is called Hurd Lake, for a grantee.

Roshea.—(Pronounced Ro-zhee). A bay (called on the maps, Salisbury Bay) and a settlement in Albert County. The name is, without doubt, an English corruption of Enragé, the French name of the Cape prominent here, though the name of the cape itself has been from early times Cape Enrage (see Enragé Cape). It occurs as *Roshea* in the Calhoun Diary of 1771, and in the Land Memorials of 1785 as Cape *Rosier* and *Rosear* apparently. In a N.B. Statute of 1875 it is called *Roshea Bay*. The Post-office name Little Rocher, is, of course a form of this name.

Rothesay.—In an article in the St. John Globe, of Dec. 14, 1901, it is said:—
“On the 4th August, 1860, a deputation of summer residents [at Rothesay] waited on the Prince of Wales on his arrival there to take the steamer for Fredericton, and requested permission to name the young settlement Rothesay, after one of his titles, “Duke of Rothesay.”

Rumbling Mountain.—On the Odell, near Tobique, so called from noises said to be heard there (Bull. N.H.S., V, 237).

Rusagonis.—The preferable form of this name.

Sabbies River.—*Savoy's River*, in Land Memorials of 1818; said locally, and no doubt correctly, to be for a mill owner of that name.

Sagwa.—Recently named R.R. Station; name from Rand's Micmac Dictionary, meaning *waist deep water* (see earlier in these addenda).

Saint Andrews.—Our knowledge of the origin of this name is fully summarized in Acadiensis, II, 184.

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Saint Croix River (Charlotte).—The name St. Croix was at first given to the island, but was soon extended to the river by Champlain, who was rather careless in his use of it, applying it sometimes to the entire river and sometimes to its lower tidal part. Thus, some confusion later arose among those using his narratives, such as Denys, who understood him as making the River St. Croix and the River of the Etchemins two distinct rivers, when they are the same.

The local pronunciation is invariably St. Croy. There is some evidence that the early settlers pronounced the word Croix in English fashion. Thus, in the Courier Series, CII, there is a deed of 1785 which spells the name Saint Croyick's. B. Glasier in 1764 spells it St. Croys (Coll. N.B. Hist. Soc., II, 313).

Ste. Croix River.—An early name for the Miramichi. In an important document of 1686, mentioned later (under "Settlement of Richard Denys de Fronsac") the name is restricted to the river below Beaubear's Island, but the maps extend it much higher.

Saint David.—The Patron Saint of Wales, and hence naturally associated with St. George, St. Andrews and St. Patrick.

Saint John City.—On this and the alternative names it bore or which were proposed for it, see Raymond in Canadian History Readings, 50; Coll. N.B. Hist. Soc., II, 65. There is a discussion of the origin of its Indian name *Menaguasche*, meaning "place where dead seals are gathered," in St. John Telegraph, June 3, 1901.

St. Martins.—Despite much search, I have not been able to find a reason for the application of this name. Possibly it was suggested by the presence within its bounds of Martin's Head. I have sought to find some connection with a former Loyalist centre in the Colonies. I find that the region now called St. Martin's, in Maryland, was a Loyalist centre in the Revolution (Van Tyne, Loyalists, 166; Scharf, Hist. Maryland, II, 296); and, curiously enough, just north of it in Delaware is a *Sussex* (as there was in New Brunswick when these names were first given), which is probably only a coincidence, but which may have suggested the name.

Saint Simon.—The origin of this name is probably not as given by Cooney from that of a French vessel sunk here in 1760, but for the name of her captain (compare later, under Historic Sites Addenda, Acadian Period, St. Simon). Locally the name is invariably pronounced St. Simo (or, at least, the final syllable a nasal hardly sounding the n), and the word Inlet of our maps and charts is never used.

Its Micmac name, as I am told by Joe Prisk, of Bathurst, a very reliable Micmac, is *See-bes'-kaa-daan*, meaning, as he says, something like a "carrying-over place." The earliest use that I have found of the name is in the Land Memorials of 1805, where it is called *River Saint Simon*, and *Saint Simon's River*, and it is called *St. Simond's Inlet* in the same Memorials of 1816, and *Saint Simon's Inlets* on Ferguson's plan of 1820, copied later in Map No. 33.

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Saint Stephen, Town.—A part of the town once bore the name Dover, which seems to have originated the name Calais. Thus, the late G. A. Boardman, in an article in the *St. Croix Courier* in 1895 or 1896, wrote as follows:—"In 1806, now ninety years since, the people of Township No. 5, by act of the legislature and in accordance with the wishes of the people, received the name of Calais. A part of St. Stephen was then called Dover Hill, and it was thought appropriate to call No. 5 Calais. It was hoped the people of St. Stephen would take the name of Dover, as that was the name of a coast city in England." This is curiously confirmed by a statement in Wedderburn's *Statistical and Practical Observations* of 1836, where (page 16) he says:—"Saint Stephen, from its locality, is the Dover of the Province, and opposite the thriving American Calais." Again, Johnston, who was here in 1849, tells in his work on North America (II, 157). "It was nearly dark when we arrived at St. Stephens; and found comfortable quarters in Dover Street—the names of the town on the one side of the stream, and of a principal street on the other, carrying the mind far away, to scenes very different on the whole, but where frontier towns and rival populations were also *vis-à-vis* with each other." There is now no Dover Street in St. Stephen, but the name Dover Hill is still in use.

The Indian name of St. Stephen was, according to Gatschet (*Eastport Sentinel*, Sept. 15, 1897), *Kitchi Medabiauht*, meaning great landing, because an important camping place.

St. Tooley.—One of the headlands of Quaco Bay (name used locally, but not on any map). In all probability a persistence and corruption of St. Louis, a name applied by Champlain in 1604 to one of the rivers here. (Discussed in *Bull. N. H. S. N., B.*, IV, 72).

Salkelds Islands.—It is, perhaps to these that Champlain applies the name *Jumelles*, "the twins" (or sisters) in this vicinity. The origin of "Fothergills" is not known to me.

Savage Island.—Called upon the early maps *Indian Island*. The persistence of the form *Savage* unquestionably is an inheritance from the French to whom, of course, it was *Isle Sauvage*. There is a *Savage Island*, having, no doubt, a similar origin on the St. John about 10 miles below the St. Francis.

Serpentine.—This name occurs also as name of a branch of Shogomoć, as the outlet of French Lake Oromocto, and as an inlet of Ludgate Lake, St. John, all of them, no doubt, named for their crookedness.

Sevogle.—This name is, no doubt, of Indian origin, but the meaning is very doubtful. The late Michael Flinne, Indian teacher, told me it meant "sour," referring to some early incident in which the fish were supposed to have been driven away by a poisonous substance which spoiled or soured the water. On the other hand, Rev. Father Pacifique tells me the Indians derive it from a word meaning "cliffs," a meaning which would be fairly appropriate, though not more to this river than to others of this region. Considering that the Square

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Forks, in which two branches of the river meet in a great T-shaped gorge, is the most remarkable feature of the river, one might expect the name to apply in some way to them. I think it very possible, however, that the name originally applied to the Little Sevogle only, and was extended to both rivers by the whites, and for this reason, Rand gives (Reader, 91) for Little Sevogle, *Elmunakuncheech*, meaning "a beaver's hole." Now, *Elmunakun* is the universally used (by the Indians) name for the Northwest Miramichi, and the application of the name *Elmunakuncheech*, or "Little Northwest," to the Big Sevogle itself would be entirely natural (since in physical features, arrangement of branches, etc., the Northwest and Sevogle are strikingly alike) and in accordance with the Indian custom, while it seems wholly improbable that so insignificant a stream as the Little Sevogle would be called the "Little Northwest." Hence, I think, it likely that Sevogle was applied originally to the Little Sevogle, and extended to Big Sevogle by the whites as an easier word to pronounce than the Indian name.

The word first appears in the Land Memorials of 1805 as *Little Sougle*, though in 1809 as *Little Sewogle*; early maps and records also have Sevogle. The local nomenclature of the river will be given in an article on the Sevogle, to be published in Bulletin No. 25 of the Natural History Society of New Brunswick.

Shediac River.—An old plan in the Crown Land Office names the south branch of this river *Kibougouck*, no doubt its Micmac name.

Sheephouse Brook.—A large branch of the South Branch Sevogle; called also Big Brook. Locally the name is explained as originating in the building of a little house for a sheep which a hermit kept there one winter as a companion. This explanation seems to me very artificial, even though names and dates are supplied with it, and I think it very likely it is a corruption of the Micmac *See-boo-sis*, meaning "a brook." The fact that its English equivalent is Big Brook is rather confirmatory of this. (Its location is given approximately on a map in Bull. N.H.S., V, 228).

Shemogue.—As at present in Land Memorials of 1803. Rand (Reader, 84) gives for *Chimegwe*, no doubt this stream, *Oosumoogwik*, meaning horned river. I have been given by a Micmac *Sim-oo-a-quick*.

Shiktahawk.—The preferable spelling of this name.

Shin Creek.—In this form in 1811 in the Land Memorials. Perhaps, for Shin River, in Scotland.

Shippegan.—Locally this name is pronounced in two ways; first, by the English it is very strongly accented upon the first syllable, the final syllable being very short; and second, by some French settlers speak-English it is sounded Shippegang, the final syllable strongly sounded, a form which is old, as shown by Winslow Papers, 501. Its earliest known appearance is in 1656 in the form *Cibaguen*. (Letter of Father Ignatius, Archives, 1904, 335);

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Shogomoc.—The D. Campbell map of 1785 has *Shogomuck*, or *Snow Shoe River*. It is called *Little Eel River* by Sproule, map of 1787.

Siegas.—As *Shiegask* or *Troublesome River* on Sproule's map of 1787 (see Map No. 39, later).

Skiff Lake.—Named, as I was told by Mr. John Stewart, by Hon. John McAdam because when he first cruised it for lumber, long prior to any settlement in the vicinity, he found there a skiff. This may have been a relic of the Titcomb survey of the lake in 1794.

Slugundy.—A name, apparently Indian, which is in local use (though not on any maps) on the St. Croix between Grand and Chepedneck Lakes, on the Lepreau and on Tobique. It appears to apply to rapids or small falls. The same word appears on the Mattawamkeg, according to Springer, *Forest Life and Forest Trees*, 167, and, perhaps, occurs elsewhere on Penobscot waters. Possibly has some relation with *Magundy*, which see.

Smith's Creek, Kennebecasis.—Said locally, as I am told by Mr. W. H. Venning, to have been named for an old trapper who hunted on the stream before the advent of the Loyalists, and whose camp stood at its junction with the river.

Spednic.—Name of falls and also a lake on the east branch of the St. Croix; of course, a lumberman's corruption and abbreviation of the Indian Chiputneticook.

States Brook.—No doubt given by the surveyors in 1818, because it fell just west of the due north line from the source of the St. Croix, hence falling into "the States" according to the American boundary claim.

Sunbury.—After long study I have been able to determine the origin of this name, which so long puzzled all our local historians. It was given, no doubt, in honour of the Earl of Halifax (for whom Halifax was named), who was also Viscount Sunbury, as fully discussed in the *Educational Review*, XV, 159.

Surreau Blanc.—Name of a stream and inlet at Tracadie, between Big and Little Tracadie, said locally to have no meaning in modern Acadian, but very probably an early corruption of *Ruisseau blanc*, that is, "white brook." I have found the name on an old plan in the Crown Land Office in the form *Seirreau Blanche*.

Sussex.—P. 1786. This parish was very likely so named in memory of Sussex, in New Jersey, a supposition to some extent confirmed by a recent newspaper statement, seemingly reflecting tradition, to that effect. Though I have not been able to trace a positive connection, the fact that Sussex, N.J., was a Loyalist stronghold in the revolution (Lee's *New Jersey*, II, 311 and elsewhere), and that many men from a New Jersey regiment settled in the parish seems to confirm this supposition, especially as so many of the parishes were thus named

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for the former homes of the settlers. It is, perhaps, only a coincidence that the names of the four parishes established in Kings County in 1786, namely, Sussex, Springfield, Westfield, and Kingston, all occur in New Jersey, and further, that Hampton and Norton, established in 1795, also occur in that State.

Tabusintac.—This name is pronounced locally, especially by elderly unlettered people, Tabasintac, a form almost exactly like the Indian pronunciation, thus affording another example (with Madawaska, Jemseg, etc.) of how much closer the local pronunciation keeps to the original form than does the map or literary form. The accent is strongly on the last syllable.

The three principal branches of this river bear Indian names which appear (apparently for the first time) upon Davidson's plan of the river of 1830, with the spellings *Maliaget*, *Eskedelock*, *Pisiguit*, which are exactly the local pronunciations used by lumbermen and others. I am told by Joe Prisk, the intelligent old Indian of Bathurst, that *Mal-e-a'-git* (g hard) means married, referring to two of something near together, while *Os-ka-dil'-lik* (as he pronounces it) means (though doubtfully) "a good shot." Also the branch *Cowassaget Brook* (which see) is still so called locally. (On *Batkwedagunuchk*, on Tabusintac Beach, see Rand, *Legends of the Micmacs*, 212).

Tantramar.—Occurs on a map of D. Campbell of 1799 as Tantaramar, perhaps the earliest appearance of the first r.

Tanty-wanty.—This old name is locally said to be of Indian origin. I think it highly probable it is an imported Indian name, like *Poodiac*. The settlement Geary, as shown under that name, is a shortened corruption of Niagara, and was so named by settlers from that place. Now, a few miles from Niagara is a place called Tonawanda, but formerly called by variants of that name such as Tonawanta. Now, Tanty-wanty in New Brunswick is about as far from Geary as Tonawanda from Niagara, and hence I think it very probable the name was given to this stream by the early settlers of Geary. It occurs first on the map of the Queens-Sunbury County line in 1839, in its present form, Ward in 1841 (St. John River, 30) speaks of it (Tante Wante) as a place not a stream.

Taxes.—Both the older and better form is Taxes, not Taxis, since it was named, no doubt, for the Indian Tax.

Tedish.—In this form in 1803 in Land Memorials.

Telegraph Hill.—A more correct account of these places is in *Historic Sites*, 348, and also later in the present work.

Terreo Lake, Kings.—Undoubtedly for Therriault one of the Acadians formerly living at French Village. See later, in *Historic Sites Addenda*, and Map No. 22.

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Tetagouche.—Is the better form. A partially French form appears on Arrowsmith's map of 1838, in the form Tete-a-gouche. Gesner (New Brunswick, 197) says, "Tootoogoose corrupted by the French to Tete-a-gouche." A story has grown up to explain the French form of the name,—that the first explorers found it heading to the left, etc. Rev. Father Pacifique writes me he believes this name is simply the Micmac *Odoodoogucch*, meaning a squirrel. Curiously enough, the older plans of the river show a narrow place near Grand Falls on this river called "the squirrel's jump."

Tiarks Lake.—On Tiarks own map of 1820 this lake is called Rimousky Lake; it first appears in its present form on Graham's map of 1843. It is not true that Tiarks was afterwards an arbiter in the New Brunswick-Quebec boundary controversy—that was Travers Twiss.

Tobique.—There is, I think, no question that this river was named for an Indian chief of that name who lived formerly on the river. The tradition of the Indians themselves to this effect is confirmed by the D. Campbell map of 1784 which has (corrected copy) *Tobique's River*, the possessive confirming this origin very strongly. That there was such a chief as Tobique is shown by various documents which Mr. Raymond has mentioned, and also by an entry in the register of the Indian church at Kingsclear, which reads:—"Le vingt deuse aout 1767 a été inhumé a Medoactec Noel toubic chef decedé pendant l'hyver agé de plus de soixante ans. Le corps d'Agnes toubic sour du défund mort le printems fut aussi inhumé en meme temps. Charles Bailly, pretre."

The Indian name of the river is *Negoot*. I am inclined to think this name is connected with Nictau = Forks, alluding to the frequent forking of the river in its upper part, especially the right hand branch.

The nomenclature of the many lakes on the right-hand branch is mentioned under *Negoot*, which see, and that of the vicinity of Nictor Lake is given in Bull. N. H. S., IV, 250.

Toby Guzzle.—Name of a small deadwater, and very crooked branch of the Digdeguash near McAdam, and also formerly a station or siding of the railroad here. A Guzzle is an English term for drain or ditch. The word is also used in the Field-book of the Surveyors of the Magaguadavic in 1797 for tiny streams emptying into a lake.

Tracadie.—The local nomenclature is mostly simple and self-explanatory, being obviously descriptive. I have not been able to identify the *Anscout* branch of the river mentioned by Cooney. The odd Acadian name *Surreau Blanc*, and *Barreau Point* are discussed separately. *John Boys River*, a former name for Portage River, is said, as Dr. Smith tells me, to have been named for one John Nile, dit, John Boy, who lived beside the bridge crossing Portage River. *Bonami Nose Brook* was named, as I learn from different sources, for one Bonamy or Barnaby Noel, an Indian, who formerly lived there, and, I presume, the name is a corruption of Bonami Noel's Brook, though locally a rock of a nose-shape, etc., is adduced to explain the name. *Lord and Foy Brook* is so named for early lumbermen.

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Traceys Brook.—See Mistouche.

Truittes, Rivière des.—A river flowing into Miramichi, a boundary of the Seigneurie of Richard Denys de Fronsac; identity unknown.

Trues.—See under Settlement Origins.

Tryon Settlement.—So named, in all probability, in honour of Major Tryon, private secretary to Sir John Harvey at the time it was laid out in 1838. He married a daughter of Sir John Harvey. I have found no direct evidence of this, but have found no other person of sufficient prominence at that time to entitle them to the honour. It is locally explained by a legend mentioned a few pages earlier. It is commonly said it was named for the surveyor who laid it out, but this is not so, for it was surveyed by A. Blair in 1838.

Tuadook.—Name proposed in 1901, a restoration of the Micmac Indian name, for the southwest branch of the Little Southwest Miramichi River. The name, with the local names in the vicinity and along the entire branch, are discussed in Bull. N.H.S. N.B., IV, 463, and V, 321, 324.

Two Rivers, Albert.—Used first in the Calhoun Diary of 1771 in its present form.

Udenack.—On Sproule's map of 1786 as *Udeneck*.

Upsalquitch.—The history of this word, seeming to show that our present form is derived simply from a misprint of the locally-used form, *Absetquetch*, is given in Bull. N.H.S., V, 180. The mountains around Upsalquitch Lake were named in 1902, as fully described in Bull. N.H.S. N.B., V, 80.

The usual meaning attributed to the Indian form *absetquetch*, namely a branch or smaller river, is not accepted by Mr. D. Ferguson, of Chatham, who knows the place and Indians well. He says he has understood it meant *Aptsh*, meaning more or again, *al-cootch* or *at-cooch*, "blanket or covering," thus signifying more-blanket river, alluding to the coldness of travel upon it in winter. I think this fanciful; and I believe the explanation that it means the little river, in contradistinction to the main Restigouche, is correct.

Utopia Lake.—In an article on this lake in the St. John Telegraph, July 5, 1892 (copied from Forest and Stream), the late Edward Jack says that the lines on the Magaguadavic were only started by Buffington, the surveyor, and when Capt. Clinch ran them out and found them running into the lake, putting most of the land under its waters, he named it Eutopia. It occurs on Sproule's map of 1786 as Utopia. Its Indian name is further discussed in the Bull. N.H.S., III, 47.

Vin, Bay.—See Bay du Vin.

Wakefield.—P. 1803. I have not yet been able to settle the origin of this name, which, I surmise, must have been given for the early home of some of the settlers. It was, however, a district or settlement name before it was applied to the parish, for it occurs in 1801 in the Land Memorials.

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- Walkemik.**—Name proposed in 1904, a restoration of a Micmac Indian name, for the upper north branch of the Little Southwest Miramichi. It, with the many local names in the vicinity is discussed in Bull. N. H. S., N. B., V, 332.
- Wapskehegan.**—Occurs in 1819 as Wapskehagan. In a MS. left by Edward Jack it is said to mean "arrowhead river," because on it was found jasper good for the purpose.
- Wards Creek.**—The connection with Lieut. Ward, given by Lawrence, is questioned by L. Allison (letter), who finds no evidence for it.
- Washademoac.**—Called *Lac Dagidemouack* in a document of 1755 in the Parkman MS (New France, I, 243, in Library of Mass. Hist. Soc.).
- Waterford.**—P. 1874. Said locally to have been named by Mr. A. McAfee, from Ireland, presumably for that place in his native home.
- Waubigut.**—Appears first in the Geological Survey Map of 1881, and placed there by Dr. Ells (or his assistant, Dr. Adams), who obtained it from a guide who had hunted much with the Indians.
- Waugh River.**—(Locally pronounced Wa-oo, and supposed to be Indian). For a former resident.
- Wauklehegan.**—Name of a lake, no doubt Indian, near McAdam Junction; see Bull. N.H.S., V, 47.
- Weldford.**—Name compounded from the names of the two members of the local legislature from Kent in that year (1835), John W. Weldon and John P. Ford, as shown in the Educational Review, XV, 160.
- Welsford.**—Named by Dr. Robert Bayard, a resident there when the railroad was built, in honour of Major Welsford, a friend of his son, who was killed while leading an attack on the Redan (Information from the late I. Allen Jack, and also so stated in a notice of Major Harvest, in the St. John Sun, Jan. 18, 1902).
- West Passage, Campobello.**—Called by Champlain *Petit passage de la rivière Sainte Croix* (Voyages, Ch. XV). This name (*Petit Passage*) was applied to it also in 1756, or later, as shown by testimony in the Boundary MS.
- Whately, Mount.**—The statement here given is confirmed by Mr. A. D. Richard, Registrar of Deeds for Westmorland, who tells me his records show that Robert Whately lived there in 1794.
Mr. Trueman tells me it was earlier called Camp Hill, because of the camp established there by Jonathan Eddy in the Eddy Rebellion (amply confirmed in Archives, 1894, 362).
- White Horse.**—A MS. letter of 1796, by David Owen, gives this as "penguin-hors or outer penguin, now corrupted into White Horse." I do not understand this reference, but presume it is one of Owen's fanciful etymologies, mentioned at the close of this Dictionary.

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Wickham.—P. 1786. No doubt for Wickham, in Hants, England, with which Captain William Spry, who had extensive pre-Loyalist grants in this vicinity, was in some way associated, as fully discussed in the Educational Review, XV, 160.

Wilkinson Mountain.—In honour of John Wilkinson, New Brunswick geographer (Bull. Nat. Hist. Soc. N.B., V, 333 and 445).

Winiguit.—Has the same history as *Waubigut*.

Wolves.—The name is very likely a translation and abbreviation of the French name for seals—namely, lous marins or sea-wolves.

Woodmans Point.—Mentioned in Allan's Journal of 1777 (Kidder's Revolutionary Operations, 92). It is not of course, that now so called at the mouth of the Nerepis, but was probably at the place where Randolph and Baker's mills now are, opposite Indiantown (Coll. N.B. Hist. Soc., I, 115), as Dr. Raymond writes me.

Woodstock.—P. 1786. Named, without doubt, for the 3rd Duke of Portland (the same for whom Portland, St. John, was named), who was Viscount *Woodstock*. Discussed fully in the Educational Review, XVI, 13.

Woolastook.—Discussed also by Chamberlain in N.B. Magazine, II, 107. Mr. A. S. Gatschet writes me that as a result of his study of the name:—"About Woolastuk there is a mystery; navigable (good) river would be *Woolatuk*—now, what does the s mean?" He is inclined to agree with a suggestion of the Indian, Louis Mitchell, that it is wool, meaning good—ahs, meaning salmon-spearing, and tuk, meaning river. Compare Aroostook, earlier.

Recently applied to a railway station near Nerepis (see earlier, in these addenda), formerly called Ballentines.

The name was proposed in 1901 for the Glacial Lake which formerly occupied the basin of the lower St. John (*Glacial Lake Woolastook*), in Bull. N.H.S.N.B., IV, 322. Two years later the name Glacial Lake Acadia was proposed for it by Dr. R. Chalmers, who was apparently unaware of the earlier name (Geological Report).

Yoho.—Occurs first as *Yahoo* in a grant and on a map of 1810, very likely given by the surveyors for some incident of their survey. As *Yoho Stream* in Land Memorials of 1818. (Yahoo occurs, of course, in Gulliver's Travels, by Swift). Its origin appears to be locally entirely unknown, though supposed to be Indian. The only other place in the world where it occurs is in the Yoho Valley lately opened up in British Columbia. I have found that in the latter place it is reported to be Cree Indian, an exclamation of wonder and astonishment.

York, County.—Certainly in honour of the Duke of York, for whom Frederickton was named (Coll. N.B. Hist. Soc., II, 60).

Youghal.—Named, no doubt, for one of the places of this name in Ireland, from which country some of the early settlers came.

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283. The sketch of the development of our knowledge of the origin of place-nomenclature of New Brunswick, given on this page of the monograph, I find to be incomplete, and it is more accurately as follows. The earliest list of origins of place-names in New Brunswick, known to me, is a considerable list by David Owen, preserved in MS. among the Owen papers in possession of the Campobello Company. It gives origins to a large number of Indian names about Passamaquoddy, but, the author being dominated by the idea that all Indian names had been adopted by the Indians from the French, the list is quite valueless. Thus he derives Passamaquoddy from *Passe en Acadie*, "a way to Acadie," Grand Manan from French words meaning *Great Mary*, and so on, in sundry imaginings without any fact basis. The next list known to me is a very brief one, dated 1823, of Indian names on the upper St. John given along with a list of those of Maine by Moses Greenleaf, the Maine Geographer, and recently reprinted in his biography (Bangor, 1902). Then follows the important one of 1832 given by Cooney and cited on this page of the Monograph. Of later date is a short list (of some nine names) by Gesner in the New Brunswick Courier in Nov. (after the 18th), 1837, which seems to be the first appearance of several origins,—Oromocto, Nashwack, Pokiok, etc., which later became widely current. Considerably later, about 1855, a number of Indian names were collected by Dr. Robb in connection with his proposed History of New Brunswick, and the list is in his MS. now in possession of Rev. Dr. Raymond. It is, however, merely a general collection representing no critical study. Later came the various writings mentioned on this page of the Monograph. Since the publication of the Monograph I have continued my studies on the subject with results contained in synopsis in the preceding dictionary. Some of the matters of the most importance I have treated somewhat fully in articles in the Educational Review (XV, 159; XV, 204; XVI, 11 and XVI, 189) while in the first and fourth of these articles I have given Bibliographies bringing the subject down to the latter date. Since then I have published additional notes in various Bulletins of the Natural History Society of N. B. (Vol V, 47, 67, 80, 87, 180, 193, 204, 215, 226, 311, 321, 324, 332, 426, 434, 466) in collections of the N. B. Historical Society, II (scattered through Historical Geographical Documents) and in later Monographs of this series, especially in that of Origins of Settlements. A special phase of some interest is the naming of places for scientific purposes, as noted in the Bulletins, IV, 322, V, 204, 426. Dr. Raymond has also published some notes on New Brunswick names, in Hay's Canadian History Readings, 49, and Mr. George Johnson has discussed some New Brunswick

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names in articles on Canadian place-names in a pamphlet printed at Ottawa in 1898, in the *Canadian Magazine* XII, 289, in "Canadian History Readings, 87. Mr. A. S. Gatschet has also published a second article on Passamaquoddy Place-names in the *Eastport Sentinel* for Sept. 15, 1897. New Brunswick names occur in the Reports of the Geographic Board of Canada, and these, together with a newspaper discussion centering around them, have already been considered on an earlier page. The local names in and around St. John were discussed fully in the *St. John Globe* of June 20, and July 4, 1893 (with criticisms in intermediate and following numbers), and the street names of that city were all discussed in the *St. John Sun*, Feb. 22, 1905. Mr. James Vroom has published, as a separate leaflet, under date Sept. 22, 1904, a list of the names of school districts in Charlotte County with comments. These publications appear to bring the subject down to this date (March 1906).

III. ADDITIONS AND CORRECTIONS TO THE MONOGRAPH
ON CARTOGRAPHY.

325. Two further examples of survival of ancient types of maps into modern times may be here cited. The map of Acadia in the latest edition of Parkman's "Montcalm and Wolfe" (1897) shows a part of the southern coast of New Brunswick practically following DesBarres map of 1780, over a century earlier. The cause of the survival is easy to show. This map follows that in earlier editions of Parkman's work, which in turn was taken largely from Haliburton's "Nova Scotia," which was taken from Purdy's *Cabotia* of 1814 (and later), which draw the interior topography of southern New Brunswick from DesBarres, 1780, (on page 392 of the cartography), the best map of the interior then available.

But a much more remarkable case is found in the map of the Maritime Provinces in the volume on Canada in Stanford's *Compendium of Geography and Travel*, a work prepared with great care. This map marks "Kilmaquac" in York, "Trues" in Charlotte, "Howardville" in Northumberland, old and long abandoned names along the Restigouche, and other features belonging at least fifty years earlier. It is not difficult to trace the origin of these names, for they occur upon maps by Wyld of date prior to 1840.

327. The pre-differentiation types. Since the publication of this *Cartography* there has been great activity in the study of early American cartography, and not only have several valuable works appeared upon the subject (for example *Harrisse Découverte.....Terre Neuve*, and Nordenskjöld's "Periplus") but several collections of photographic fac-similes of early American maps, notably Stevenson's fine series of "Maps illustrating early discovery and exploration in America, 1502-1530," and Hantsch and Schmidt, "Kartographische Denkmaler," have been issued, making accessible both some new maps and also better copies of some of the older ones. So far as my observation has extended, nothing of vital importance, nothing tending to supply any great amount of new knowledge, or to cause any great change in our present ideas, has developed. Nevertheless in the light of these new materials, the entire cartography of Acadia needs a critical re-examination, which I hope later to give.

331. On the identity of the places named on the Maggiolo map, Weise's "Discovery of America" is very important.

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333. There is a very remarkable resemblance between a part of the Gastaldi 1556 map (from Angoulesme to C. Breton), and a part of LaCosa, including the interior canals, which are the same in both. This Gastaldi map appears to be a compound of a part of the La Cosa with a part of Mercator, and an addition of some names from Cartier.

332. The Santa Cruz map given by Nordenskjöld in his "Periplus" L, is important, and appears to have influenced later maps.

338. The map Fig. 8 is by a curious error attributed to Harley, who was simply its modern owner; its author was in all probability Desceliers. On him and his work there is an important paper by HARRISSE "Dieppe World Maps," in "Göttingsche gelehte Anzeigen," 1899.

348. Miscou was not mentioned by Champlain in the work cited. Compare under Miscou in the dictionary preceding.

349. Although the earliest published map of Acadia by Champlain himself bears the date 1612, the influence of his work appears in several of earlier date, including those of Lescarbot, and the James I map of 1610 in Brown's "Genesis of the United States." Of course he made maps of earlier date, as he himself tells us in his narrative of 1608, where he says he gave to DeMonts the map and plan of the most remarkable coasts and harbours there. A MS. map of his, apparently of 1607, is in possession of HARRISSE in Paris.

352. The 1632 map is closely followed by that of Boisseau, 1643, in Vol. XXIII of the Jesuit Relations.

Another map belonging to this period is that of DuPont, given by Dawson in these transactions, III, ii, 179.

360. Possibly the map on this page may be connected with the Simon François Daumont, Sieur de Lusson, who, about Sept. 1671, was ordered to make explorations in Acadia, and who returned to France in November of that year. (Jesuit Relations, LV, 320).

A map of 1701 of Acadia by De Chavagnac is mentioned in Canadian Archives, 1899, Supplementary Vol., 350.

The map by Aubrey, with documents, is still in existence in the Paris Archives, (Jesuit Relations, LXVI, 344).

I have had the Jumeau map on this page compared with the original in Paris. As a result the Ottawa copy is shown to have the following mistakes; as the words are readily recognizable I give only the correct form—*memchigan*, *pakmouch*, *tracadi*, *Pkichemagan*, *chibouctouch*, *haran*.

364. On the Indian traditions about the River St. Croix, see the full account in St. Valier's "Estat present de l'Eglise" of 1688, 14.

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I have had the Franquelin-de Meulles map opposite page 364 compared with original in Paris, with the result that I find the Ottawa copy has been very carelessly made, a large number of the names being omitted altogether, and a great many others misspelled. These errors are as follows; since the incorrectly-spelled words can readily be recognized, I give here simply the correct spellings, while words omitted are in brackets.

(*Ristigouche*), (I. *Techniquet*=Heron Id). *pogomkik Pogomk*, (*Pointe Pepchidiachich*=Belledune Point), *Karaquet*, *Kednatteguet*, *Tabogunquet*, *Mtotou*, *ouetchitouchkik*, *tcaganech*, *Pichiamnach*, *Tatagoumisak*, (R. *Ste.*=before Croix), *Minouisak*, (R. *Kepchkigoe*=the lakes at the head of R. Ouelamoukt), (R. *Namamgamkikak*=upper stream on the south of same river), (R. *Kepchkigoe*=next stream below latter), (*Nogentes*=on the north side of lake at head of Chicodi), (*Nempugo*=on the south of the latter lake), (R. *Richbouctou*), (R. *Mijouemigail*, =the stream just east of chimenpy), (R. *Mijouemiguilchich*=the upper part of the main river chimenpy), *Meulles*, (*Havre neuf*=the harbour just above the letter B in R. au Bar) *dosquet*, (*Nachouac*, with a conventional building, just above Le Ramouctou.)

Unfortunately the copyist's errors I have found when I have had Ottawa copies of important documents compared with the originals in Paris and London are not confined to these two maps, but extend to documents as well, at least one of which was as full of inexcusable errors as the Franquelin De Meulles map. This experience gives me a great hesitation in accepting the testimony of copies at crucial points; and it also conveys the lesson that a more careful supervision should be exercised over the copyists engaged to copy documents from the archives in Europe.

365. The de Rozier map is of such great interest that it is reproduced herewith (Map No 1). It is among the Parkman papers in the Library of the Massachusetts Historical Society, and I am indebted to Dr. S. A. Green, the Librarian of the Society, for the copy and for permission to publish it. It does not include the whole map, but the parts of interest to New Brunswick. While containing some curious errors, it is at the same time wonderfully accurate in the St. Croix-Magaguadavic-Oromocto region, far more accurate indeed than any other map for nearly a century thereafter. The map produced no effect upon any other later maps that I have been able to trace, and it seems itself to have been made quite independently of any others. Apparently it was made entirely from the personal observation of its author. Presumably the circles indicate Indian camping grounds.

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365. Several references to explorations in Acadia which may have a bearing upon the cartography of the country are given in the Canadian Archives, Supplementary Vol., 1899. Thus in 1688 a St. Pasquine, an engineer went to Acadia (page 283), and in 1698 one Sr. L'Hermite explored Acadia (330). There are other references on pages 285, 300, 302, 352. It is very probable that the map dated 1708 by Franquelin was really made about 1690, for in 1689 a royal order was given the authorities in Canada to give every possible facility to Franquelin in making a survey of the northern parts of America. (285; also Quebec Docs. II, 451).

367. On the identity of the places shown on the map of Southack consult the Monograph on Boundaries, 268.

373. In Prowse's Newfoundland, 279, is a map dated 1720 giving some of the names which I supposed were used for the first time by Bellin in 1744. Either I am mistaken in this, or the date of the Prowse map is an error.

374. An interesting, but fallacious attempt to explain the carrying of the Nepisiguit and Restigouche so far north was made in a report by the Renwick Boundary Commission. (Richardson's Messages of the Presidents, IV, 149).

377. The north shore opposite Prince Edward Island remained unexplored and unsurveyed longer than any other part of the New Brunswick coast. Thus Little, in his work of 1748, says—"the Bay of Vert, in which, and all the Eastern side of the Province, as far as the mouth of Canada River, lie a great variety of fine rivers and harbours, very little known to us, as no person has ever been employed by the Government to attempt a particular discovery of them."

378. The Mitchell map of 1755 here given is the first edition, not the one used by the Commissioners of 1783. On this map consult the Monograph on Boundaries, 302, and see the photographic copy later in the present paper under Boundaries.

381. The Sayer and Bennet map was made by Holland, Surveyor General of Quebec.

382. In addition to the map of the Chignecto region here mentioned, several others exist as noted in the List of Maps following.

386. John Mitchell's Field book, with a copy of his map (in part), have been published by the N.B. Historical Society in their Collections, II, 175.

390. I have been able to determine the authorship of this important map. In the Library of Congress there are two copies of it,—one almost identical with the copy here printed, entitled, "Sketch

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of St. Joh[ns] Harbour and a part of the River," and another, very similar, but not identical (giving depths along the river and some slight difference in names), entitled, "A sketch of St. John's Harbour and Part of the River, surveyed by Mr. Holland, drawn by Cha. Morris, Chf. Surveyr. 1761." I presume the Mr. Holland, who made the survey for this map was Samuel Holland, afterwards Surveyor General of Lower Canada. No doubt he was with Monckton's expedition in 1758 whose course and operation it reflects exactly, as shown in the fully reprinted Report in the Collections of the N. B. Hist. Soc. II, 163.

393. I have been able to clear up the mystery attached to the Peachy Map and its relation to the cartography of the time, and also to trace out with fair completeness the dawn of the modern cartography of the St. John River, hitherto somewhat puzzling.

The Peachy map proves to be a copy of the map made by Captain (Joseph?) Peach in 1761, the resemblance in the names of the two men being purely a coincidence. This is made plain by a map in the Public Record Office, entitled, "A sketch of the communication between the Bay of Fundy and the River St. Lawrence by the River St. John, from Capt. Peach's observations and route in the year 1761, and of others since that time.....Copied and corrected by Geo Sproule." This map with the others mentioned in this paper are more fully described in the list of maps a few pages beyond. My copy of this map (including the part above St. Anns, with notes on the part below) shows that from St. Anns upwards it is the Peachy type exactly, though below it is of the Morris type, following his survey of 1765. Although this map lacks the curious names of Peachey below St. Anns, I have no question that they are upon Peach's unknown map of 1761, and they were not used by Sproule because the later, more exact and detailed map by Morris was available for that part of the river, though no other was available for the part above St. Anns. This map was no doubt drawn by Sproule in or about 1782 (or 1783), and certainly before the Morris map of 1783 and the Campbell map of 1784-85. In 1783, therefore, this combined Peach-Morris map was the best of the St. John accessible, and for this reason it was used by Munro when he ascended the river and made his well-known Report in 1783. Report and map are in such close agreement that there is no doubt of this connection between them. Peachey's map was made in 1787, no doubt, because there is in the British Museum a plan of the Falls of Madawaska by him bearing that date. I take it that Peachey was with the Deputy Postmaster of Quebec when he descended the St. John in 1787 and made the Report preserved in the British Museum, (Crown CXIX, 59, 2. b.), and having

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with him only the original Peach map, and not the later Peach-Morris map, he used the former and made the copy to accompany a report of his journey. Several other maps following the Peach type, but differing more or less among themselves, showing that they were copied not from one another so much as from some accessible original are mentioned in page 394. I am inclined to think the Peach map was published, and, if not, it was probably accessible in several copies, and we may therefore hope that it will yet be found.

We will now trace the other early maps of the St. John, and the evolution of its Cartography to the present. The earliest survey map of the River was that accompanying the Monckton Report (Cartography, 290), which was made, as earlier shown, by Samuel (?) Holland. Its topography appears upon a later map by Morris, namely, the "Chart of the Peninsula of Nova Scotia of 1761" (see List of maps later). Next came the Peach Survey of the river of 1761, of which I know nothing more than is contained in the preceding paragraph. Next to this, and completely independent of it, comes an anonymous undated map of great interest preserved in the Library of Congress and reproduced herewith (Map No. 2) entitled,—“Survey of the River St. Johns from fort Fredrick in the Bay of Fundy to the River Medauesqua with the Lake Temesacuata and the grand Portage from thence to the River St. Lawrence.” Unfortunately it is but a fragment, including the river from the Bay of Fundy to the head of the Long Reach, but it is of very great interest because of its extremely detailed and accurate character. The topography is more accurate than that of any later map down to Owen’s survey of 1846, though the nomenclature is curiously erroneous at the Belleisle, which is confused both with the Kennebecasis and the Washademoac. There is no clue to author or date, but the inscription—“the French use this way when they go to fetch cattle, etc.”—seems to show that the French were in numbers on the river when it was made, and certainly it must antedate the Morris map of 1765. As Morris shows no trace of its influence, I surmise that it was made about the same time as his own (1765) but independently. Happily a clue to its authorship is given us in the valuable documents recently published in the Collections of the N. B. Historical Society. Under date Dec. 14, 1764, (308) Captain Glasier describes a recent trip to the St. John river (in November) in the course of which he says,—“I had the best Information from the Indians and Inhabitants settled 40 miles up the river, and the Engineer of the Fort who had just been up to take a plan of the River.” There is nothing to show who

this Engineer was, but I take it he was the author of this map. However that may be, the map appears not to have become known to his contemporaries, for no trace of its features appears, so far as I have been able to find, in any other map. Very probably the engineer carried it back with him to New England or New York and no copy was ever sent to England.

The next map of the St. John was a very important one, that made by Chas. Morris, Surveyor General of Nova Scotia, in 1765, which included the St. John to above St. Anns, the coast to Passamaquoddy and that region. The original is in the Public Record Office, together with a still unpublished Report accompanying it. Some very interesting references to this survey occur in the Glasier Papers above mentioned, especially on page 322. This detailed and accurate map was extensively copied (several of the copies being given in the list of maps later) and naturally, being official, became the original for all maps of the lower river for the next twenty years, or until the survey of D. Campbell in 1785. Morris' map ended a short distance above St. Anns, and so far as I can find, no new survey, replacing Peach's of 1761, was made until after 1781, in which year, according to a note in the Archives Report for 1894 (398) the river had apparently been surveyed only about 95 miles, approximately the distance of the Morris map. Since Munro used the Peach Map of the upper river in 1783 apparently no other had then been made, but upon a valuable MS. map in the Crown Land Office, containing grants and other information to 1784 but none thereafter, there is an excellent map of the river from survey all the way to Grand Falls, on a scale of 4 miles to an inch, with no trace of the Peach nomenclature, but using names substantially as at present, and clearly the foundation of the modern nomenclature. The original of this map is, I believe, in the Public Record Office (see List of Maps following under 1783?) and I surmise that it was made in 1783 or early 1784 by Charles Morris the younger, and it is very likely the "Sketch of the River St. John" mentioned Dec. 1783 in the Archives Report for 1894, 411. It was followed closely by Sproule in his fine map of the southwestern part of the Province of 1786, (reproduced in the Monograph on Boundaries opposite page 412), but in no published map known to me. The best maps of the St. John in 1784, therefore, were the Morris of 1765 up to above St. Anns, and the supposed Morris of 1783 thence to Grand Falls. In the winter of 1784, however, an important map of the St. John based upon a survey of considerable accuracy from St. Anns to Grand Falls was made by Dougald Campbell,

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and his map, in the Public Record Office, has been reproduced in the New Brunswick Magazine, II, 233¹. Campbell evidently used the Morris 1783 map, for he adopts most of its names, adding many new ones of Indian origin (giving in many cases their translation). The next winter, 1785, he surveyed the lower river to the Bay of Fundy. The dates of these surveys are fixed by a correlation of the statement on the map itself, "from an actual survey in the winters of 1784 and 1785," and a letter of Governor Carleton (in his letter book at Fredericton), of date July 16, 1785, which speaks of D. Campbell's survey of the St. John River from Grand Falls to Manguerville made winter before last, and from Manguerville to Bay of Fundy, since his (Carleton's) arrival, (in Nov. 1784). Campbell's map, with additions from land surveys, etc., became the basis of Sproule's fine map of 1786 for the part below St. Anns, but, curiously enough, not for the part to Grand Falls, for which he follows the Morris map of 1783, apparently without reference to either Campbell's names or topography. This great map of Sproule's² (already mentioned as reproduced in the Boundaries Monograph, 421), became at once the original of the lower river for all maps down to the detailed survey of Owen in 1846, which latter survey is the original of all our maps down to the present day. Though Sproule used the Morris 1783 survey for the river from St. Anns to Grand Falls, that map did not become the original for this region, for the very next year, 1787, Sproule himself made a survey of the entire river from Fredericton not only to Grand Falls but to the Madawaska, Temiscuata and the St. Lawrence. This fine map is in the Public Record Office, and parts of it are reproduced in this paper (Maps 14, 15, 38, 39.)

¹ Where also there is a biography of Campbell by Jonas Howe. I have had this copy of his map compared with the original in London, and it has the following mistakes:—I give the correct forms only, with omissions in brackets. *Wechenegunigunikeck* or *Great Falls*, (*Restook* or *Jacquo's River*), *Tobique's River*, *Tall River*, *Tranquady*, (*R. Schogomuck* or *Snow Shoe River*), *Pekuyauk*, (*Oromocto I.*), (*Swan Creek*), (*Latitude of Partridge Island 45° 20' North*), (*Manawagonish*), (*Magnetic North. Variation 14° 40' West*).

² It seems well-nigh impossible to have accurate copies made of maps in European Archives even by professional copyists. Having my experience with the Jumeau and the Franquelin-DeMeulles maps, earlier mentioned, in mind, I have impressed upon those making copies for me the necessity for absolute accuracy. This was the case with my copy of the Sproule 1786 map; yet when my copy was reproduced exactly in the Boundaries Monograph and later sent back to England for comparison with the original, the following mistakes were found, the correct spellings only being here given, and the omissions being marked by brackets. (*River Monquart*), *Poqueouk*, *Mactuguack*, *Thoroughfare*, = between Grand and Maquapit Lakes), (*Patticake Creek*), (*Kennebeckacis River*), (*Glebe* = at the northwest corner of Saint Stephens parish), (*Boannus River*), (*Ripples* = above Sixth Falls), (*Indian Reserve*), = at Second Falls).

Cartography.

For the section from Fredericton to Grand Falls, he uses the Morris names, adding some others, and his map became at once the original for that part of the river, and so remained until the year 1826 when it was superseded by the map of the detailed survey by Foulis mentioned on page 401 of the *Cartography*.¹ The Foulis map was superseded for the part from Nackawic to Nashwaak by the Playford map of 1835, which remains the type map for that region, as Foulis map does of the river thence to Grand Falls, to the present day. For the river from Grand Falls to Madawaska, the Sproule map of 1787 contains the first survey, and it remained the original of all maps of this part of the river down to the commencement of the International boundary surveys, which produced various improvements, and added the river above to the St. Francis and beyond. The best of these surveys were those made by the International commissions after 1842, on which further information may be found in the *Monograph on Boundaries*, 345-347. Such is, I believe the complete history of the evolution of the cartography of the River St. John, so far as its New Brunswick part is concerned.

395. The Laurie & Whittle map of 1794 is identical with one of 1788 (see list following) published by Robert Sayer in 1788. This map represents a sub-type for the St. John, using as it does the Peach type, but it remains the same for the North Shore as the 1776 Sayer & Bennett map of page 381 of the *Cartography*.

396. Some attempt to prepare a map of the Province appears to have been made in 1801-1802, for in these years (Feb. 18, 1801, Feb. 20, 1802) the House of Assembly petitioned the Governor to have a map of the Province completed, but no resultant map is known to me. Another, MS. map, seems to have been prepared in 1814 (House of Assembly Journals, March 2).

397. The various important maps resulting from the Boundary surveys, the importance of which is wholly underestimated in the "*Cartography*," are described in the *Monograph on Boundaries* and are listed in the list following. I have in the list given only those of marked importance, especially those containing original information, omitting compilations to show positions of the boundaries, etc.

Another map of some interest made about this time was one of the Magaguadavic in 1785. Under date Sept. 21, 1785, the New Brunswick Council Records show that there was authorized a warrant "to issue to the surveyor general to survey the Magaguadavick to its source." Evidently this survey was made, though the original map is unknown to

¹ There is a biography of Foulis in the *New Brunswick Magazine*, I, 247.

Cartography.

me, for a survey extending to opposite Oromocto Lake (but not to its source) is shown on the Sproule Map of 1786. This survey continued the original down to 1798 when the very detailed surveys of the river, the originals of all of our present maps, were made under the authority of the Boundary Commission.

As to the 1785 map of the Scoodic (St Croix), it appears there were two of them made. Thus a letter written by Governor Carleton (in his letter-book at Fredericton), reads (July 15, 1785), "Having employed two persons of skill and experience to make separate surveys of the River Scoodic, the first of which was performed in winter upon the ice and the second after the opening of the river." (Compare also the Report on Archives, 1895, N. B., 4). The latter map is without doubt the one in the Public Record Office, mentioned at the foot of page 417 of the Cartography. It was that followed by Sproule in his map of 1786, and very likely it was made by Sproule himself. The former is unknown to me, but as a note in the boundary MS. speaks of a survey of the Scoodic made by John Jones for the British Government, I assume this is the map and surveyor referred to.

398. The map by Wright is given in my Dochet (St. Croix) Island Monograph.

402. In 1845-1846 the Rivers Madawaska and St. John were surveyed by Quebec, and also by New Brunswick, (Blue-Book on the Quebec-New Brunswick boundary, 21, 62). There were thus four sets of surveys, and all of much accuracy, made of the upper St. John within a few years of each other. They were, (1) those of the Graham Commission, (2) those of the Quebec Government, (3) those of the New Brunswick Government, and (4) those of the International Commission, on all of which there is further information in the Monograph on Boundaries, and the maps resulting from which are mostly in the list following. The present New Brunswick maps of the upper St. John appear to rest upon the New Brunswick surveys, which were made in great detail by Andrew Inches, and of which there is a good set in the Crown Land Office. These are the maps erroneously stated in my Monograph on Boundaries, 347, to be a set of the maps of the International commission.

408. *Classified List of Maps.* Since the publication of the Monograph I have gathered a great number of additions to this list, of all grades of importance, but I shall here note only those of marked historical value.

Cartography.

I.—THE PRE-DIFFERENTIATION TYPE, 1500-1534.

1500. **LaCosa.** This Map has been reproduced in these Transactions, III, ii, 268.

Several of the important maps of this section are reproduced in Nordenskjöld's very valuable work, "Periplus," in which he also gives a list of 174 MS. maps of America before 1560, and others of them are in Harrisse's "Terre Neuve," and others in Stevenson's recent Reproductions, and Hantsch & Schmidt's "Denkmäler."

II. THE CARTIER TYPE, 1534-1604.

1541. **Desliens, N.** Reproduced exactly in Hantsch & Schmidt.
1542. **Santa Cruz, Alonzo de.** Map in Nordenskjöld's "Periplus," L.
1558. **Homem, D.** Reproduced exactly in Hantsch & Schmidt.
1592. **The Molineaux Globe** is produced exactly by Miller-Christy in his "Silver Map of the World," Plate X.

III. THE CHAMPLAIN TYPE, 1604-1703.

1625. **Du Pont.** In these Trans., III, ii, 179.
1643. **Boisseau.** In Jesuit Relations, XXIII.
1684. **The Franquelin Map** is in Jesuit Relations, LXIII.

IV. THE DELISLE TYPE, 1703-1744.

1744. **Southack, Cyprian.** A map of the Coast of New England, from Staten Island to the Island of Breton; as it was actually survey'd by Capt. Cyprian Southack. In the English Pilot, 1744, 24 x 31¼ inches.

V. THE BELLIN TYPE, 1744 to 1770.

A great number of maps of this type exist in the many American or world maps published in this period, but only the following are important for New Brunswick:

1755. **L'isthme de l'Acadie, Baye de Beaubassin en Anglais** Shegnekto Environs du Fort Beausejour. A Paris, Chez le Rouge..... levé en juin 1755. In the Lenox Library. This is, no doubt, the original of the practically identical English plan of the same year.—"A large and particular plan," etc.
1755. **A Plan of Chignecto** (called also, by the French, Beau-Bassin) at the Head of the Bay of Fundi upon the Isthmus of Accadia; showing that Harbour with its Rivers, the Situation of the English Fort, and Fort Possessed by the French; June, 1755. 11 x 15 inches:—MS. in the Library of Congress.
1755. **Tonge, W.** A Draught of the Isthmus which joyns Nova Scotia to the continent with the Situation of the English and French Forts

Cartography.

& the Adjacent Bays and Rivers, by W. Tonge, Chignecto Fort Lawrence, 1755.

A MS. in British Museum. It is very like, though not identical with the "Map of the Bason of Chignectou," of the Cartography, page 414.

1756. A Map of the Surveyed parts of Nova Scotia.

A MS. map of the Chignecto region with fine plans of Fort Cumberland and Gaspereau; in the British Museum.

VI. THE MODERN TYPE, 1770 to 1820.

1758. Holland, Samuel (?) Sketch of St. John's Harbour and a Part of the River. Reprinted in Coll. N.B. Hist. Soc., II, 166.

There are two copies of this map with the same title in Library of Congress, one of them giving the name of its author, Mr. Holland

1761. Morris, Chas. A Chart of the Peninsula of Nova Scotia. 31 x 23 in.; 10 m. = 1 inch (about).

MS. in the Public Record Office, Vol. 9, No. 6.

1761. Morris, Chas. A plan of the District of Chignecto. Published in the Archives Report of 1904.

1764? Anon. Survey of the River St. Johns from Fort Frederick in the Bay of Fundy to the river Medauesqua with the lake Temesacuata and the grand Portage from thence to the river St. Lawrence. 21 x 30 in.

MS. in the Library of Congress. Reproduced in Fig. 1 preceding.

1764. Mitchel-Bernard. A Plan of Passamaquoddy Bay or the Bay of St. Croix. 26 x 33 inches; scale about 1 mile to an inch.

MS. in Public Record Office, B.T. 10, 59. Reproduced in the Monograph on Boundaries, 229, and in altered form in Coll. N.B. Hist. Soc., II, 177. Topography and names in part by John Mitchel, with additions by Governor Bernard.

1765. Morris, Chas. A Plan of the River St. Johns and Passamaquoddy Bay Done by order of His Excellency Montagu Wilmot, Esqr., Governour and Commander in Chief of the Province of Nova Scotia, &c., &c. 6½ x 7½ feet; 1 mile = 1 inch.

MS. in the Library of Congress. Reproduced in Map No. 2 preceding.

1765. Morris-Mitchel. A map of Passamaquoddy showing the land grants. 34 x 30 inches; 1 mile = 1 inch.

MS. in Crown Land Office, made by Morris, using Mitchel's map of 1764 in part. The grants seem to have been added by Holland.

1765. Johnson, Guy. Map of the River St. John in the Province of Nova Scotia, Exhibiting the Grants to Officers, &c., in 1765, with other Patents. From the survey of Mr. Chas. Morris and other surveys. 26 x 17 inches.

MS. in Library of Congress. Very similar to the map in the Coll. N.B. Hist. Soc., II, 305.

Cartography.

- 1767? **Wright, Thos.?** A Plan of the Northern Coast of the Bay of Fundy and the River St. Johns in the Province of Nova Scotia. Endorsed Part of Nova Scotia by Mr. Wright; Towns on St. Johns River, Nova Scotia, by Morris. 37 x 24 in.; 1 league = $\frac{1}{4}$ inch.

M.S. in Public Record Office (Box 43, No. 23). Reproduced in the Archives Report for 1904.

1774. **Morris, Charles.** A Plan of the River St. John, etc. I find the map in the Public Record Office bears the inscription, "Copy from the original Survey made some years ago. Geo. Sproule, London, July, 1784."

It is very probable that another map in the same office is another copy of this; it is entitled, A Plan of the River St. John in the County of Sunbury, Prov. of N. Scotia, from St. Anns opposite the mouth of the Nashwaak River to Partridge Island in the Bay of Fundy. 6 feet x $2\frac{1}{2}$ feet; 1 mile = 1 in.

- 1782? **Sproule, George.** A Sketch of the Communication between the Bay of Fundy and the River St. Lawrence by the River St. John, from Captain Peach's Observations and route in the year 1761, and of others since that time..... Copied and Corrected by George Sproule, late Captain in His Majesty's 16th Regt. of Foot. 54 x 19 inches; 5 miles = 1 inch.

MS. in the Public Record Office (Case 43, No. 22).

- 1783? **Morris, Chas.?** Map of St Johns River from its mouth to the Great Falls. 4 miles = 1 inch.

MS. in Public Record Office (Case 43, No. 21): Probably that mentioned in Canadian Archives, 1894, 411.

1786. **Sproule, George.** Plan of the South West Part of New Brunswick including the River Saint John as high up as the Great Falls: shewing the Lines of the Counties and Parishes, and of the different grants and allotments hitherto made in that District. Compiled from Actual Surveys by order of His Excellency Governor Carleton. By George Sproule, Esqr. Surveyor General, assisted by Mather Byles Deputy Surveyor Saint John. June 1786. 6 feet by 7 feet 10 inches; 2 miles = 1 inch.

MS. in Public Record Office, Case 41, No. 7; reproduced (reduced) in the Monograph on Boundaries, 412.

1787. **Sproule, George.** Plan of the Communication by the River Saint John, from Fredericton in New-Brunswick, to the River Saint Lawrence; with the Settlements in that extent. From an actual Survey taken by order of His Excellency Lieutenant Governor Charleton, in July and August 1787, by George Sproule, Esqr. Surveyor General of New Brunswick. 5 x 9 feet; 2 miles to an inch.

MS. in Public Record Office (Case 43, No. 26).

- 1787? **Peachey, Jas.** This map is described as "A colored map of the Post Route between the River St Lawrence & the Bay of Fundy, drawn by J. Peachey, Ensn. 60 Regt." Scale $5\frac{1}{2}$ miles to an inch 4 ft. x 1 ft. 9 in. British Museum.

Cartography.

Also "A colored map of the Post Route between the River St Lawrence thro the Lake Madawaska to the St John's River." 3 ft. 10 in x 1 ft 8 in. scale 2 inches to a league. Also in British Museum.

- 1787? **Map of the Coasts and Rivers of part of Maine and New Brunswick.** 4 miles to an inch.

MS. in Public Record Office Case 40, No. 54. It is largely a reduced copy of the Sproule map of 1786, but with some slight additions.

1788. **Sayer, Robert.** A new and a correct map of the British Colonies in North America, comprehending Eastern Canada with the Province of Quebec. New Brunswick, Nova Scotia, and the Government of Newfoundland.....London, 26½ x 19 inches; scale 60 miles = 1 inch.

1791. **Hall, W.** Quebec. Map of part of the province comprehending also Nova Scotia, New Brunswick, Cape Breton, & New England, showing at one view the 5 great American Lakes.

MS. in Public Record Office. (Case 42, No. 53). Closely follows Sproule of 1786 and 1787.

1798. **Sotzmann, D. F.** Maine, Entworfen von D. F. Sotzmann. Hamburg bey Carl Ernst Bohr. In Ebelings Erdbeschreibung von Amerika. The map is partly in English and partly in German, and is notable for its accuracy, at least in region bordering upon New Brunswick.

1798. **Sproule, George.** A Plan of the Rivers Scoodic and Magaguadavic. With their principal Branches.....By George Sproule Esqr. Surveyor General of New Brunswick, from the actual Surveys of those Rivers.....1796-7-8.

Reproduced in Moore's International Arbitrations, 30, and from that reduced in Monograph on Boundaries, 254.

1799. **Campbell, D.** Sketch of the Route from Fort Cumberland to Fredericton. From a Journey performed between the 13th and 23rd December 1799 by H. R. H. the Duke of Kent, Commander in Chief in British N. America &c &c &c.

MS. in British Museum 34 x 58 inches. An excellent map without much detail.

1808. **Richardson, James.** Map of Passamaquoddy Bay from actual survey. Published as the act directs by James Richardson, January 18, 1808 Caverhill.

Probably the same as that in Atcheson's American Encroachments, and the one used so often in the Boundary Documents.

1817. **Johnson, John.** A map of the boundary line explored in 1817, by John Johnson, U. S. Surveyor.

i.e. the line from the monument to the Wagan. 9 x 44 inches; scale 2¾ inches to a mile (nearly).

Well drawn map, with the St John merely sketched but having several Indian names on its tributaries not elsewhere recorded.

1817. **Bouchette, Joseph.** Plan of the exploring survey from the source of the St Croix River to the Great Waggansis or the waters of the Restigouche, between the 27th. July and 9th. Oct. 1817.

MS. in the Library of the Department of State, Washington, 22 x 107 inches; scale 80 chains to one inch.

Well drawn map on a very large scale showing in great detail the topographical features along the due north line, important to N. B. History because it is the most detailed original map of the line which forms the present boundary.

1818. **Odell, Wm. F.** Plan of the exploring survey in 1818. (Viz the north line from the Wagan to the watershed near the St Lawrence).

MS. in the Library of the Department of State, Washington. 16 x 48 inches;

1818. **Johnson, John.** A map of the country explored in the year 1817 & 1818.

MS. in the Library of Department of State, Washington. 37 x 64 inches; scale about 3 miles to an inch.

Prior to the Survey of Green River, which is only sketched in.

1818. **Tiarks, S. L. and Burnham, H.** [Map of Green River and the sources of the neighbouring Kedgewick waters]. 15 x 28½ inches; scale, 2 miles to 1 inch.

MS. in the Library of the Department of State, Washington.

This is the original for this country of the Map A, and all published maps down to the map of Graham of 1843. The Report of the exploration of the river is referred to in Monograph on Boundaries, 321.

1818. **Tiarks, S. L. and Burnham, H.** Map of a Survey of Tuladie and Green Rivers. 31½ x 45 inches. Larger scale than preceding and contains some information not on the latter. Neither is an original (Indeed none of those referred to as in Library of the Department of State is original but all are copies).

MS. in the Library of the Department of State, Washington.

1820. **Burnham, Hiram.** Map of the Country explored in the years 1817, 1818, 1819, & 1820 by order of the commissioners under the 5th article of the Treaty of Ghent. Scale about 8 miles to an inch.

This is important as the original of the Map A of the Case laid before the King of the Netherlands.

MS. in the Library of the Department of State, Washington.

1825. **Wylde, James.** Map of the Province of New Brunswick and Nova Scotia. In general style of his later maps but on a smaller scale. First map to mark the counties, which however it does very erroneously.

1825. **Hall, Francis.** Plan of a proposed Canal from Bay Verte to Cumberland Basin. A copy of this plan (the original being lost) with the accompanying Report is in Haliburton's History of Nova Scotia. Vol II, 73.

1826. **A map of the Great Road between Fredericton and Saint John.** From an actual survey made in October 1826. By Mark Scully, D.L.S. 50 ch. = 1 inch. A very detailed, beautifully drawn and important map.

Cartography.

1830. **Dashiell, S. L.** Map of the Northern Part of the State of Maine and of the adjacent British Provinces showing the portion of that State to which Great Britain lays claim. Reduced from the official Map A..... 16 x 17 in. 24 miles = 1 inch. In "Statement of the United States laid before the King of the Netherlands."

The original "Map A" was in MS. and seems never to have been reproduced. I possess a tracing of a part of it on a scale of 8 miles to 1 inch. See "1820, Burnham" preceding.

1830. **Wilkinson, John.** A Map of Campobello and other Island in the Province of New Brunswick, the property of Will. Owen Esq. Sole surviving grantee, etc. drawn by John Wilkinson Agt. to Wm. Owen Esqr. Campobello, 30th. September, 1830. Mentioned by Mendenhall in Am. Antiquarian Soc. Report, 1896, 21.

1835. **Playford.** A survey of the St. John from Nashwaak to Nacawicac. MS. in Crown Land Office.

1838. **Arrowsmith, J.** Lower Canada, New Brunswick, Nova Scotia, Prince Edward's Island, Newfoundland and a large portion of the United States. London. 38½ x 24 in.; 35 miles = 1 inch. Beautifully engraved.

1839. **Deane-Anson.** A Plan of the Disputed Territory and adjacent Country to accompany the Report of F. G. Deane, M. P. Norton and J. Irish, Commissioners appointed by Governor Kent in 1838 "to run and locate the N. E. Boundary of the State". Drawn by W. Anson under the inspection of John G. Deane, Portland Me. March 1839.
MS. copied from the original in 1841, in the Crown Land Office.

1839. **Featherstonhaugh and Mudge.** Map of that Portion of Her Majesty's Colonies of New Brunswick and Lower Canada the title to which is disputed by the Government of the U. States, with parts of the adjacent country..... 46 x 28 in.; 15 miles = 1 inch. In British Boundary Blue book, 1840.

1839. **Wyld, Jas.** Wyld's Sketch of the North Eastern Boundary in Dispute between Great Britain and the United States. 3 ft. x 2 ft. 10 in.; 30 miles = 1 inch.

- 1840-1841. **Graham, J. D.** Maps of the Meridian line from the source of the St. Croix to beyond the St. John, and of the St. John River to the Madawaska. These maps were made in the survey of the North-eastern boundary of the United States, which was brought to an abrupt conclusion by the signing of the Webster-Ashburton treaty. I have not been able to discover their location; they appear not to be in the State Department at Washington where other maps of the same survey are preserved. They are all reproduced much reduced in Graham's published map of 1843 (Compare Richardson's Messages of the Presidents, IV, 112).

Cartography.

1842. **Bell-Renwick.** Map of the Green River [of St. John] with the sources of Rimouski Mistigougueshe and the Grand Fourch of Ristagouch [Katawamkedgwick] Surveyed in the years 1841 and 1842 under the direction of James Renwick, LL.D. 24 x 44½ inches to a mile.

MS. in the Library of the Department of State, Washington.

A very detailed and beautifully drawn map. First published on Graham's map of 1843.

1843. Map to illustrate the Boundary line established by the Treaty of Washington of the 9th of August, 1842, between Her Majesty's Colonies of New Brunswick and Canada and the United States of America. 16 x 14 in.; 30 miles = 1 inch (about)

In British Blue book of 1843, and the same, differently coloured, in Blue Book of 1845.

1843. **Graham, J. D.** Map of the Boundary Lines between the United States and the Adjacent British Provinces from the mouth of the River St. Croix to the intersection of the parallel of 45 degrees of North Latitude.....

Published originally in Congressional Documents, 27th Congress, III Session, Document 31. and also in Moore's International Arbitrations, 149. 27 x 22 in.; 16 miles = 1 inch.

A map of the utmost importance which became the type map of its region, only improved subsequently by the addition of materials from new surveys by the International Commission, and others.

- 1843-1844. **Estcourt-Smith.** [Maps of the International Boundary from the Monument at the source of the St Croix to Glazier Lake on the St Francois.] Made under the direction of the Commissioners J. B. B. Estcourt and A. Smith, Commissioners for surveying the International Boundary.

MS. maps beautifully executed, in many sheets; preserved in the proper government department in England. Scale 4 inches to the mile, with some portions (as described in Richardson's Messages of the Presidents, Vol. IV, page 175) on a larger scale.

A complete set of these maps, of the entire boundary, was lithographed by the United States Government under direction of Major J. D. Graham. A set is in the Library of the Department of State at Washington, and there is a set in the possession of each State touching upon the boundary. (On this compare "The First International Railway" by L. E. Poor, New York, Putnams 1892, pp. 20-24). They are of the greatest local interest, not only geographically, because of their great accuracy, but also historically because they give the locations of all settlers, etc., along the river.

1845. **Crawley, H. O.** Plan of the Ground between Cumberland Basin and Bay Verte, with three other plans. In his "Report on a Survey of a Line for a canal to unite the Bay of Fundy with the Gulf of St Lawrence, in 1842." In "Papers on subjects connected with the duties of the Corps of Royal Engineers," Vol VIII, 1845, 186-193.

Cartography.

Also Plan of the Ground between Shediac Harbor in the Gulf of St Lawrence and Dorchester in the Bay of Fundy. In the above.

Also Plan of the Ground between Shediac Harbour and the Petitcodiac River. In the above.

1846. Map of a Part of the Provinces of Canada and New Brunswick.....
40 x 24 inches. 4 miles = 1 inch. In Wells Report on the Quebec—
New Brunswick Boundary.

Map of the Western Boundary of New Brunswick from the mouth of the River St Croix to the southern boundary of Canada.....
40 x 12 inches; 4 miles = 1 inch. In Wells Report.

Plan of all the Lands granted under the authority of New Brunswick on the Northern side of the River St John and westward of the Commissioners Line. 32 x 12½ inches; 100 chains = 1 inch. In Wells Report.

1846. Bouchette, Joseph. Map of the Province of Quebec New Brunswick Nova Scotia etc. 7 ft. 2 in. x 3 ft. 10½ in.

1848. Robinson, Henderson and Johnston. Map to accompany and illustrate the Report of her Majesty's Commissioners for the Settlement of the Boundary line in dispute between Canada and New Brunswick. 29 x 20 in.; 22 miles = 1 inch. In British Blue book of 1851.

1851. Lushington and Twiss. Map to illustrate a scheme for settling the Boundaries of Canada and New Brunswick..... 20 x 17 in.; 15 miles = 1 inch. In British Blue book of 1851.

1852. Wilkinson, J. Map of the Exploratory Survey made in the year 1847 between the upper part of the Ristigouche River and the valley of River St Lawrence for the purpose of the Halifax and Quebec Railway.

A large book in the Crown Land Office containing 13 beautifully drawn maps, on a great scale, largely the original of our representation of that region.

1862. Walling, H. F. Topographical Map of Westmoreland and Albert Counties. From Actual Surveys by D. J. Lake and H. S. Peck, Drawn and Engraved under the Direction of H. F. Walling. Published by W. E. & A. A. Baker, 36 Dey St. New York. 1862. 1½ miles to 1 inch; 5 ft. 3 in. x 4 ft. 9 in.

1864. Fleming, Sandford. General Map to accompany Report on the Inter-colonial Railway; Exploratory Survey, of 1864. Made under instructions from the Canadian Government. 5 ft. 8 in. x 2 ft. 8 in.; 8 miles = 1 inch.

1876. Roe and Colby. Map of Carleton County New Brunswick. Compiled and Drawn and Published from Actual Surveys by Roe & Colby. St John N. B. 500 Rods to an inch. 4 ft. 10 in. x 4 ft. 2 in.

1894. Bailey, J. W., Canoeman's Map of the Upper St. John. In his St. John River, Cambridge, 1894.

422. The U. S. Hydrographic Office has reproduced most of the Admiralty Charts of N. B. waters.

IV. ADDITIONS AND CORRECTIONS TO THE MONOGRAPH ON HISTORIC SITES.

215. While the sites of most of the important historic localities in New Brunswick are identified, and to some extent described and mapped in the "Historic Sites" Monograph and in the following supplement thereto, I have not by any means exhausted this interesting subject. For the future student there is yet ample opportunity for service in this field. The localities having been identified, the next steps should be (1) to photograph them and their surroundings as they now are, and before they are further changed, the photographs being, of course, preserved by publication, (2) to excavate all places promising remains or relics, beneath the surface, giving accurate descriptions of the finds and their mode of occurrence, the relics themselves being deposited in some central museum in the Province and (3) to mark the places by solid but plain stone monuments bearing appropriate inscriptions. I cannot at this moment recall a solitary historic spot within the bounds of all New Brunswick marked by any memorial, a brass plate on the first Parliament building at Fredericton alone excepted. Here is enough for the local antiquarian for a long time to come!

219. Places named from the former presence of Indians (especially "Indian Point") are much more numerous than the present list implies; for many such names are used locally, but are not on any map.

222 C,—**St. Croix.** This Indian village is also mentioned in the Harris Field-book of the Boundary Survey of the St Croix in 1797 (now in possession of W. O. Raymond). Harris mentions the Indian village, Houses and Eel-Works.

222. There is an *Indian Island* in the St. Croix below Spragues Falls.

223. There is an *Indian Pond* near Baillie in Charlotte.

223. There are traditions of an Indian structure, an altar or temple formerly existing near the Canal at Lake Utopia, given in Scribner's Monthly, Vol. 15, 449; but there is no real evidence of its existence.

224. At the Falls, *St George*, was a favourite camping place of the Indians, according to a MS. note left by the late Edward Jack.

224. There is an Indian camp site, known locally, at the Narrows of Letang River.

224. The location of the Indian village at *Madawaska*, with other information about it, is given on the Sproule map of 1787 reproduced later (Map No. 39) in this Addenda. Also an interesting reference to an

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Indian fort at Madawaska given by Cadillac in 1693 is in Raymond's "St John River," 110.

There is near Edmundston an *Isle des Sauvages*, according to M. Mercure, and there are two others called *Savage Islands* just below the St Francis, marked on the best maps, showing some former residence there or other connection with the Indians.

225. **Becaguimec.** It is said locally there was an Indian camp site of some importance at the mouth of this river, on the site of Hartland, where there was a good salmon fishery.

227. **L. Ekpahak** is used earlier than 1733; see *Aucpac* in Place-Nomenclature of this Addenda.

227. **L. Oromocto.** The Indian Burial-ground here is also mentioned by Gesner in his Fourth Geological Report, (page 26) and is well-known locally.

On the shore of French lake, (around which many Indian relics are said to have been found) in a position shown on a later map (Map No. 18) is a stone cut by curious marks, locally reputed to be Indian carvings. This has been fully described and pictured in the Bulletin of the Natural History Society of New Brunswick, No. XXII, 175, where also the reputed Indian carving from higher up the river (mentioned on page 228) is shown to be unauthentic. There is an *Indian Point* in Oromocto Lake (North West Branch), explained in Bulletin of Nat. Hist. Soc. N. B. Vol V, 193.

228. **N. Indian Point.** The principal sites in this vicinity are approximately located on the sketch map (Map No. 19) given later under the Acadian Period.

228. **Maquapit, French and Indian Lakes.** These Lakes were, because of their abundant game supply (waterfowl, muskrats, fish,) favourite resorts of the Indians, and their camping grounds have been studied, and numerous relics collected therefrom, by Mr. Duncan London, of Lakeville Corner, Sunbury County, who has been so kind as to send me a sketch map of the region, (given later, Map No. 19) and some information as to the sites. He tells me there were two Indian Camping grounds at the upper end of French Lake one on French Island, and the other on the present Sand (on an old plan called *Indian*) Point, and a very extensive one at the lower end, with another on Apple Island, at the places marked on the map. There are also others known to him on Maquapit lake (marked by burnt stones, flint chips, etc., and other relics he has collected), including Londons and Simons Points; others occurred on Rings Island; and on the point near the latter, Mr. London found the aboriginal pot described by Matthew and Kain in Bulletin of the Natural History Society of N. B., XXIII, 345. There were also two of importance at the outlet of the lake. The upper part of the lake called on the maps French Lake is locally called *Indian Lake*, of course indicating the former presence of Indians there.

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228. **Swan Creek.** Various Indian relics have been found here, as I am informed by Mr. Duncan London, at the localities indicated on the sketch map which he has sent me and which is given later in this paper (Map No. 20). Wampum was found in 1858 by his father, Mr. E. M. London, then a resident of Swan Creek, at the place indicated as were other Indian relics. The wampum locality has since been much dug over by treasure-seekers.

228. Mr. London also tells me he has found fragments of flint implements and Indian pottery just below Cameron's wharf at the mouth of the Otnabog.

228.M. This Indian settlement was probably that said locally to have existed at the mouth of *Red Bank Creek*, though the distance is somewhat too great.

The name *Indian Point* is given to the point between Salmon Bay and North East Arm at the mouth of Salmon River in the N. B. Acts, for 1786-1836, 738.

228. Another Indian location on the Washademoak is described in these Transactions VI, 1900, ii, 61.

An Indian settlement, or camp-ground, of considerable importance, as shown by tradition and by many relics dug there, stood, as I am informed by Dr. B. S. Thorne of Havelock, on the big interval at the end of the portage from Peticodiac (described later in these Addenda), about a quarter of a mile below the present Peticodiac Road. Captain Pote was here for two days in 1745 (Journal, 54).

Favorite camping-places of the Indians were at mouth of *Jemseg* and at *Indian Point* directly across the St John, according to MS. notes left by the late Edward Jack.

A small Indian village at Nauwigewauk is mentioned by Raymond, "St John River," 331.

An Indian village, according to a newspaper article (St John Telegraph, Aug. 23, 1905) formerly stood in Kingston opposite Gondola Point. It is described thus;— "The red man's burial ground was just at the foot of what was afterwards called Gallows Hill, and many a relic of the chase buried with the dead warriors have been handled by the ploughman, and thus the ancients' equipment for the happy hunting grounds became the property and the curios of the white man.

The Indian encampment, was situated just in front of where the residence of Captain Pitt now stands....."

229. An old plan has an *Indian Creek*, just above the Bend [Moncton] on the south side.

Mr. H. A. O'Leary writes me that some 20 years ago and more, the Indians used to camp at Moncton beside the McSweeney spring, about 200 yards south of Halls Creek, and that the place was reputed to be an ancient Indian camp-ground. This receives a certain confirmation from the fact that this spring is the only one of any importance for a long distance around.

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An Indian camping place on the Petitcodiac about at the head of tide is mentioned in 1771 in the Calhoun diary, published in 1876 in the Sackville Post. Apparently it was on the north side of the river. It must have been near the present *Salisbury*, but inquiries I have made on the ground have failed to discover its site.

230. The Indian camp-sites, said to be three in number, at Dorchester, are described in newspaper article (St John Sun, Aug. 3, 1904) thus— one at Brownell Brook or New France, a second back of Palmer's pond, or back of the John Chapman farm, and a third below what is now called the Johnson mills."

- 230E. I have been told by residents in the vicinity that Indians camped on this Island to within a few years. It is of upland surrounded by marsh, and it would appear to form a very favourable stopping-place for those travelling in canoes along the coast, although my personal search failed to reveal any spring on it. It is now being washed away by the sea. Mr. R. P. Steeves tells me he believes there was formerly an Indian camping-ground below *St Mary's Point* in Harvey on the place formerly known as the "Two-Island Farm."

Just east of the Owl's Head near Alma is a place called *Indian Beach*, no doubt an old camping place.

At *Germantown Lake*, on the north side near the middle of its length, is a knoll with a spring and a good beach, known to have been an old Indian camping ground of some importance, and used by the Indians within the memory of persons now living. This lake is very rich in fish, and the neighbourhood formerly abounded in game, including beaver.

The point at the mouth of the Shediak River, south side, is called locally *Pointe des Sauvages* and is said to have been the site of an important Indian settlement. The Chart of Shediak also marks near by an "Indian Cemetery."

- A. The Indian settlement at *Buctouche* is now at Noel Creek, two miles west of the village of Buctouche; but Mr. H. A. O'Leary, who knows the region well tells me that formerly (up to about 1840) the main Indian settlement was on the bluff at the northern end of the present highway bridge, where now is the oldest part of the village. Indians lived at Indian Point until about 18 years ago when they moved to Noel Creek. An old Indian burial ground is also known above the old bridge on the north side of Black River.

230. **Richibucto.** For additional information about the Indian settlements at Richibucto I am indebted to Dr. J. W. Doherty of Rexton, and others. The principal Indian settlement of Richibucto in early times is said by both Indians and whites to have been on Indian Island, on elevated ground toward the eastern end, and it is no doubt here that the fortified village stood of which Denys speaks. Another old Indian settlement site was at Platts, or Shipyard, Point just below the present Marine hospital, while between the point and the hospital is the rock still visible, mentioned by Cooney, on which a traitor of the tribe was once stoned to death. Another village was

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on the Law farm just above Rexton on the north side of the river at a place still called "Indian Fields." Another possible Indian locality was just within the mouth of the Aldouane on the north side, where an old burial ground is known, though probably this was French. (see later under Acadian Period).

231. The *Renous Indian Reserve* is not on the Renous River, but on the Miramichi a short distance above its mouth, See Map 1 of Settlement Origins.
231. There is an *Indian Brook* just above the North Pole Branch of the Little Southwest Miramichi, marked on the best maps; and there is also an *Indian Lake* at the extreme head of the Tuadook, or Southwest Branch of the same river (Bulletin of the N. B. Nat. Hist. Soc. XXIII, 324). It is said locally that an old camp site is known at Porters Cove, in Ludlow, on the north side of the Main Southwest Miramichi and another on the South side at the foot of Stewart Hill, near McNamee.
232. **Tomogonops Pipestone Quarry.** An important Indian locality of the Miramichi was the important old pipestone quarry on the Tomogonopes, a branch of the Northwest Miramichi. As described to me by a resident who knows it personally, the quarry is in a ledge across the stream about six miles from its mouth. The pipestone is soft where kept wet by the stream, but is much harder where dry above its surface. The rock is taken away and used as whetstones etc, by residents of the Northwest, one of whom has given me a piece said to come from this quarry. Professor J. E. Wolff of Harvard University to whom I submitted the specimen tells me it is a very fine-grained variety of sericite schist, and seems to fulfil the requirements (soft enough to cut easily, does not crack or disintegrate with a moderate degree of heat and has a certain capacity for absorption of oily matter) of a pipestone.
232. It is said locally there was an important camp-site some 300 yards below the church at the mouth of the *Bartibog*.
232. I have also been told there was a camp-site of some importance on Murdoch's land at the mouth of the *Napan*, between that river and Miramichi. The place is known locally because of the small-pox epidemic which attacked the Indians here some years ago.
232. It is said locally there was a camp-site of some consequence on the north shore of Beaubears Island, about 200 yards from its eastern end, in a charming situation, with a spring.
232. It is said locally there was an Indian camp-site on the *Canadian Marsh* opposite French Fort Cove.
232. An old plan in the Crown Land Office shows an Indian village and improvements on a point just below the head of tide, north side, of the Little Southwest Miramichi, about a mile from its mouth. This is very likely the place mentioned as old Indian Town in Collections N. B. Hist Soc. II, 95.

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- 232F. Burnt Church, or Church Point.** Further reasons for the importance of this place are given in a note in Collections of the N. B. Historical Society, II, 379.
- 232G. Indian Point.** This place is said locally to have been the favourite camp-ground of the Indians of this region, and much the most important on Tabusintac. On some maps it is called Ferry Point, and a resident told me it was known in early days as Bartibog Point, for a chief who was much there.
- 232. Cains Point.** Another very important camp or village site, apparently the second in importance on Tabusintac, was that at Cains Point, the prominent point below Stymests Millstream on the north side, just above Big Marsh Brook. It was occupied to within the memory of men now living. Presumably the name was for an Indian of that name (a corruption of the French Etienne, as in Cains River).
- 232. Tracadie.** Although now totally abandoned by the Indians, many camp sites are known along this pleasing and game-rich river, to such an extent indeed, that, as Dr. A. C. Smith, who knows the region thoroughly, tells me, it may almost be said that Tracadie was one huge camping-ground. It is of interest to note that Tracadie means camping-ground in Micmac. One of the most important localities is the burial ground, between Tracadie and Leech Rivers containing aboriginal circular graves, which have been studied by Dr. Smith as noted in Bulletin of the N. B. Natural History Society, XIX, 306, though there erroneously attributed, as Dr. Smith tells me, to Wilson's Point, Shippegan. An important camp site was that on which the mills now stand at Tracadie Mills (Foster's or Sheila), and there was another at Point à Bouleau, which is, specially at its eastern end, of low but attractive upland. Other camp-grounds are known, as Dr. Smith tells me, on both sides of the entrance to Nicholas River, where there are two very charming points now cleared and settled, ideal sites for Indian encampments, as I have myself seen. The vicinity of Nicholas River is said locally to afford especially good eel-fishing. Smethurst, in his narrative of 1761 (Collections N. B. Historical Society, II, 375) mentions a camping place six miles from Grand Lake, which may have been one of those at Nicholas River, though more probably it was somewhere up Portage River. It is very probable that an important camping-ground was at the head of tide, which was and is a great fishing place, especially for sea-trout. Here, on the south side, just below a little brook, is an elevated upland bank still used as a camping ground and having the appearance of long use for this purpose. Many of these localities may be found marked on an historical map of Tracadie which is expected to appear in the Magazine "Acadiensis," St. John, in July, 1906.
- 232. Pokemouche.** Like Tracadie, this river has long been abandoned by the Indians, though formerly an important resort of theirs. It is of very pleasing scenery, and rich in fish and game. I have noted

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the more important of their camping grounds in my discussion of Smethurst's route in 1761 (Collections N. B. Historical Society, II, 371), but have since gathered some additional information from a visit to the river. The most important of their village sites by far seems to have been that called Red Bank at Inkerman between the two bridges on the lot now occupied by the Church. This beautiful and commanding site was occupied by Indians within memory of men living, and the lot was originally granted the Indians for their use; but it came later by purchase into possession of the Church whose right to it was actively disputed by the Indians. It is said their burial-ground was where the buildings of A. & R. Loggie now are. There was another Camp-ground, as I am informed by Rev. Father Fitzgerald, in the cove across the river, while another, of considerable importance stood upon the elevated Rivers Point at the junction of the South and West Branches of Pokemouche, on or near the charming site of the present church. On early maps this point is called La pointe à Denys which means of course Denys De Boss, said locally to have been an Indian. Since he was of sufficient importance to obtain an early grant it is altogether probable he was a chief, and his village or camp-ground was on Rivers Point. The early grant of the Indians on the opposite side of the river of course soon passed into the hands of the white settlers. Father Fitzgerald also tells me there was another camp-site on O'Donnells Point, while relics have been found, on the easterly end of Walsh's Island, (a pleasant low upland cleared island), as well as on the upland along the northern shore opposite this island. He also tells me a camping-ground is known upon the Sutherland Farm, one of the most pleasing sites upon Pokemouche, where also there is report of an Indian burial-ground. On the south side of the river, within the limits shown on the map, is an Indian reserve, no doubt established here to give the Indians the benefit of the eel fishery in the open basin near Maltempec, which is marked upon a plan of 1811 as an "Eeling place of the Indians." Various families of Indians are said locally to have camped on the reserve within the memory of residents, but I was unable to learn of any important camping ground within the limits of the Reserve, which indeed seemed to me to offer sites decidedly inferior to other places on the river. It is very likely that another camp-site of importance existed at the great fishing-place at the head of tide. Here, just beside a superb pool, there is on the north side a raised bank or terrace, now cleared and occupied by a sporting camp, and bounded by two cold spring brooks. The whole forms a very pleasant place and an ideal camping-site, and I have no doubt that it was much used as an Indian camp-ground. Upon the map of 1811 by Wm. Ferguson in the Crown Land Office, there are two points on the north side of Pokemouche named Point de la Croix; one was opposite Rivers Point where there is a low swell of upland bordered by marsh, and the other was on the east side of the mouth of Maltempec, a piece of elevated upland, now cleared and forming one of the most charming places on all of the very pleasant Pokemouche. Both of these places in all probability represented

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Indian burial grounds, the Crosses being planted on their consecrated grounds. All of the localities here mentioned will be found located upon an historical map accompanying an article on the History of Pokemouche which is expected to appear in the Magazine "Acadiensis." St. John, in October 1906.

232. **Money Island** (or Isle au Trésor). This very striking island, at one time the site of a French settlement (see later under the French period), has been within the memory of men now living a great resort of the Indians, who called it as I have been told by an old resident of Miscou, *Cache*, or "hiding-place" island, a name recalling that given by the Passamaquoddies to St Croix, or Dochet, Island (These Trans. VIII, ii, 1902, 147) I have been told by Mr. Andrew Wilson of Miscou that he has seen over one hundred families of Indians encamped here (obtaining their water from the barrens near by) while engaged in hunting seals, which formerly resorted in great numbers to the gully near by.

Indian Point, Miscou. This is said locally to have been a camping-ground of some importance. It is said there was also another camping-ground in the cove on the east side of Muddy Brook near the houses at Wilsons.

- 232F. **Caraquet**. A very important Indian camping ground, the most important in this vicinity, formerly existed on the fine point (Brideau Point) now occupied by the establishment of the Robin Colles Co., as I have been informed independently by two of the best-informed old residents of Gloucester County. The site is an admirable one, the best in this region, and its value is increased by the never-failing little brook, (Chenards Brook), which here empties into the salt water.

233. The Indian village of Restigouche is no doubt that shown on the map of 1663 in Winsor's America, IV, 148.

I have been told by Mr. D. Ferguson of Chatham formerly of Athol House, Restigouche, who knows the Indians well, that there was formerly a camping-ground at the mouth of Upsalquitch, one on the point at Campbellton, one at Point Le Nim, one at Dalhousie and one at New Mills.

Old plans show an *Indian Lake* on the head of the Popelogan branch of Upsalquitch; a brook at the head of the Northwest Branch of Upsalquitch is called by the lumbermen *Indian Brook*, and there is a small *Indian Brook* just above Bolands Brook.

233. A very important work on the ancient Portage Routes of America, tracing their influence upon the course of local history, is A. B. Hulbert's "Historic Highways of America," Vol. 7 (Cleveland 1903).

234. It is very probable that most of the Indian portages follow ancient game-trails. I have myself been privileged to see, among the remote waters of New Brunswick still unvisited by sportsmen and lumbermen, the fine game trails, forming deeply-worn paths, which the

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great game animals, especially the moose and deer, have made in travelling from lake to lake as they seek new feeding-grounds. Such trails are no doubt the result of long trial and selection by those animals, and represent as a rule the easiest, and usually the most direct, route between the waters. The first Indians to come into the country would have but to follow them. These trails tend naturally to follow the lowest ground, especially where, as is very commonly the case in New Brunswick (as I have elsewhere shown Bull. N.H.S. IV, 313) ancient valleys connect the waters. The portage routes show therefore an interesting evolution. *First* an ancient valley, deprived by geological changes of its original stream, connects two lakes, each a source of an important navigable stream. *Second* at a great time past the large game animals wandering from water to water formed marked trails along the valley. *Third* the first wandering Indian followed these trails in his first explorations, thus finding the most direct and easy route between waters. *Fourth* he marked out the trails and made them known to his fellows thus establishing definite portage routes. *Fifth*, the white man came and adopted the Indian's route in his search for lumber, places for settlement, etc. *Sixth*, the lumberman came and cut out the portage paths to allow his lumbering teams to pass, making a tolerable road. *Seventh*, the advance of settlement necessitates highways which follow the same general route, deviating in places to keep upon the best-drained ground. *Eighth*, railways follow and take the same general route parallel with the highways across the watersheds.

236. There is another cause, in addition to the removal of woods, tending to make many streams to-day less navigable for canoes than they were in pre-historic times, namely, the broadening and consequent shallowing of river beds through lumbering operations. I have been assured by at least two lumbermen of wide experience in driving and dam-building, that many streams (especially the Tracadie and the Lower Sevegle) have been extensively broadened and shoaled within their own recollection. This is caused by the tearing away of the soft banks by the rush of logs in spring, and is greatly aided by erosion from the "splash-dams," dams in which water is stored and released with a rush to carry lumber over rocky or shoal places. And the effect has become naturally more marked in recent years since it became customary to carry on lumbering upon a very extensive scale. Thus it is no doubt true that many streams, which are now too shallow for canoe travel during much of the summer, were in pre-historic times narrower and deeper, as well as provided with a heavier body of water.

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237. I have found a few cases in New Brunswick of Indian trails which seem not to have been regular portage-paths. Thus on the Miramichi a trail is locally known, called "Sock Renou's Trail," leading from Blackville (mouth of Batholcmews) to the Renous, and another "Big Louis Trail," from Indiantown (Renous) to Rocky Ledge (Little Southwest?) Of this character also was, very likely, the trail from Dorchester to Sackville, and that from near Neguac, later mentioned, to Portage Brook, near the important Indian village of Cains Point on Tabusintac. No doubt there were many such trails, as distinct from portage paths, between the Indian villages on parallel rivers.

A reason for the early abandonment of the Indian portage paths was the early building of roads parallel with them, whereupon the Indians naturally abandoned their inferior paths for the better roads. This seems to have been the case with the Tabusintac-Tracadie, the Tracadie-Pokemouche (South Branch), and the Pokemouche-St. Simon paths. No doubt in general in the early-settled parts of the province this soon occurred, and hence there the Indian trails were very early abandoned, and their locations are now locally unknown. I have seen myself a modern instance of this in the Trowser Lake—Long Lake portage on Tobique. The old Indian trail is still used on the Trowser Lake half, but beyond that it has been abandoned for lumber roads leading in the same direction.

237. Another reference to Indian canoes built of material other than birch bark is in Pote's Journal, where (page 54) he speaks of canoes of elm and ash bark. Mr. E. Jack, (Acadiensis, V, 142) speaks of spruce bark canoes, and Dr. Philip Cox tells me his Indian guides have constructed them.

239. The importance of the portage routes in the early days of New Brunswick is well illustrated by inscriptions upon the Sproule map of 1787. One of them, mentioning the Micmacs on the Restigouche, reads,—"They communicate by this river with the St. John tribe, and it also forms a convenient intercourse with Fredericton for the new settlers on Chaleurs Bay." Again under bearings and distances from Fredericton it reads:—"The distance to Miramichi, by an inland water communication through the Grand Lake, a branch of the St. John [of course via Gaspereau—Cains River] 140 miles—6 miles land carriage." And again,— "To Fort Cumberland, by the Kennebecasis, a branch of the St. John and Petcoudiac, which discharges into the Bay of Fundy, 190 miles—3 miles land carriage." In general, all the early maps and narratives make much of the portage routes.

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240. To the local portages along the St John the following should be added (1) The Baker Brook Cabineau portage, described later in this section. (2) Bouchette's map of 1831 shows a portage from the head of Little River (Grand Falls) into Grand River, but I have no other evidence of the existence of such a portage, and it is probably an error, as is the portage from Salmon River to the Tobique on Arrowsmith's map of 1837. (3) On MacLachlan's large map of Tobique, of 1830, two portages are shown around the Narrows of that river, both on the south bank, a longer leading around the entire Narrows and a shorter around its upper pitch only. (4) On Sproule's Map of 1787 a Meduxnakeag-Aroostook portage is mentioned (see later under Meduxnakeag-Penobscot). (5) A branch of Kelly's Creek is said to be called Chichawagan, (University Monthly, XIX. 4) which would mean "little portage," suggesting a possible old route from this Creek to the Rusiagonis. (6) In Munro's report on the St John River of 1787 and in the very similar document by Edward Winslow of somewhat later date (Collections N. B. Hist. Soc. II, 160), there are confused references to a portage between the Keswick and Nashwaak. I found no other evidence of such a portage, and if it existed it perhaps led from Howard Brook through to Lower Nashwaak Lake. (7) An old plan appears to indicate an early portage from Salmon Bay across to Newcastle Creek. (8) A plan of 1832 calls Coac Brook on Salmon River, *Indian Portage Brook*, for an old portage around a rapid on Salmon River at this place. (9) It is likely, also, there was a portage from Back Creek, Oromocto, through to the Nerepis, though the route would be a hard one, if not impossible in summer, because of the low water then prevailing on the upper courses of those streams. The presence of an Indian fort at the mouth of the Nerepis would suggest such a route, and imply that it was of some importance. (10) A plan of 1786 shows an *Indian Carrying Place* from the extreme S. W. corner of Ludgate Lake to a tiny lake apparently emptying into Musquash Harbor. (11) Whitney's plan of 1836 of the Inglewood Manor shows an *Indian Portage* between the present Loch Alva and Brittain Lake of that chain. A reference to the Kingston Creek—Kennebecasis portage appears to occur in the later part of Gyles "Narrative."

The old Indian portage around the falls at St. John is best shown upon Bruce's fine map of St John Harbour of 1761, and is reproduced in part herewith (Map No. 3). It also is shown, though less accurately, upon the Holland Map of 1758. There is no difficulty in recognizing the undoubted position of this portage, in part at least, by a comparison of the Bruce map with the locality, when it will be seen that the portage path must have crossed the highway in the depression just east of the Soldiers monument at Riverside Park, and its general course to Marble Cove can be identified. Tracing it towards the harbour, its course cannot be determined with such certainty, since there is more than one depression in the rocky ridges through which it may have passed, though a very careful inspection of the ground entirely to the water might show its entire course.

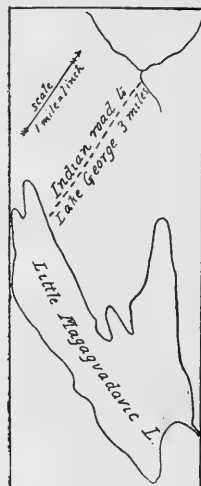
Historic Sites.

An Indian portage route, (no doubt only a hunting route not a line of through travel), extended up the Forks Branch of Canaan River, across by a portage, one and a half miles in length, to the Lake Branch, and down that stream to Salmon River, as I am informed by Mr. I. T. Hetherington, on the authority of an aged resident of Queens County. The MS. plans in the Crown Land Office show these waters approaching thus near to one another, although no printed map thus represents them.

- 241C. The Oromocto-Magaguadavic Portage is fully described and mapped in the Bulletin of the N. B. Natural Hist. Soc. No. XXII, 192, and map opposite 194. On Purdy's Cabotia (map) of 1814 the portage from the Piskahegan to the Magaguadavic is evidently an engraver's error, made by joining the Magaguadavic-Oromocto and Oromocto-Piskahegan portages into one. The latter portage is mentioned in the field-book of the survey of the Magaguadavic in 1796-1797, in



MAP NO. 3. FROM BRUCE,
1764; $\times \frac{3}{4}$.



MAP NO. 4. FROM A PLAN
OF 1827; $\times \frac{1}{16}$.

these words;— "From the head of this river [Piskahegan] there is a short portage ($\frac{1}{2}$ a mile) to a branch of the Oromocto." It was no doubt from Little to Peltoma Lakes.

The important **Magaguadavic-Scoodic** portage route has been fully worked out, and it is mapped in detail and described in the Bulletin of the N. B. Nat. Hist. Soc. XXI, 45.

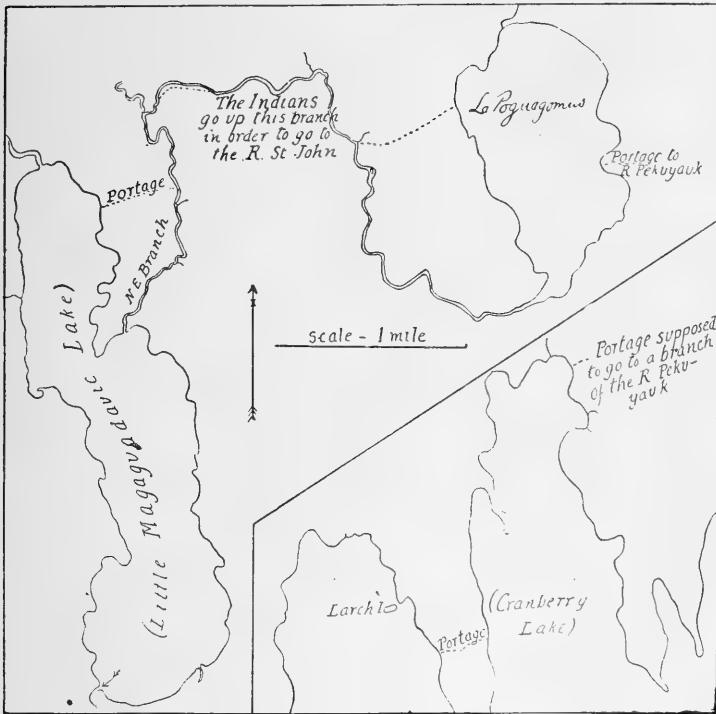
- 242D. There is an error in this description, for I find the plan here mentioned (Map No. 4) applies the name Little Magaguadavic Lake to Cranberry Lake of the present maps; hence the length of the portage to Lake George is nearly correct. This portage is better shown in a map in the Field-book of the 1796-1797 Survey, (Map No. 5.) which marks it "Portage supposed to go to a branch of the R. Pekuyauk." This map also shows the old portage between the two Cranberry

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Lakes, and as well the series from Magaguadavic Lakes towards the St. John. It is possible the Magundy Stream formed a part of this route.

Gesner, (New Brunswick, 170 and elsewhere) speaks of a communication between Magaguadavic Lake and Shogomoc, but I know nothing further of such a portage.

An old plan of the Lower Digdeguash in the Crown Land Office has this information,—“From Indian accounts..... from its source there is a carrying place to Scoodick River.” I know nothing further



MAP NO. 5. FROM THE SURVEY OF 1796-97: $\times \frac{1}{4}$.

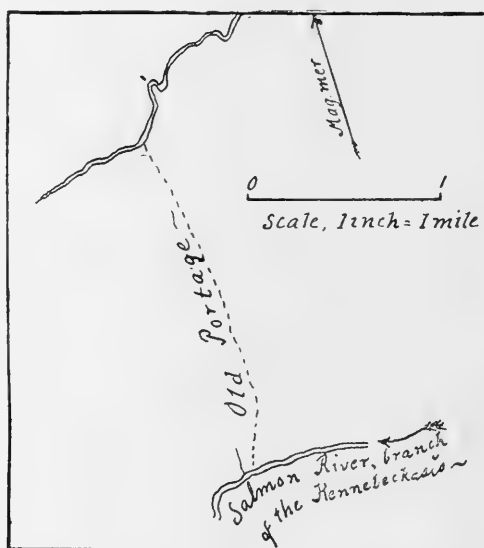
of this portage, which could have been but little used because of the difficulties of navigating the Digdeguash in low water. It very likely extended from the Upper N. W. Branch to a branch of the St Croix.

- 244A. The Grand Lake-Baskahegan portage is clearly shown on an important early map—that of the Survey of 1796-97, reproduced in the Monograph on Boundaries, 254.
245. The Field-book of the Survey of 1796-97 shows portages in two places from the West Branch of Scoodic to below Grand Falls in places where bends of the rivers come close together.
245. Meduxnakeag-Penobscot. Sproule's map of 1787, a most careful and accurate one, has the inscription,—“By the Meductsinekek the Indians

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communicate with branches of the Restook and Penobscot." The route must have been into the Matawamkeag branch of Penobscot, and, owing to the smallness of the streams, must have been a difficult, and probably only high-water, route. I have found no other mention of such route. That to Restook was probably from North Branch into Mesardis.

246. **Kennebecasis-Anagance.** From the references to this portage in the N. B. Acts, 1786-1836, 561, from an old plan (reproduced in Map No. 6) and from its length, which is several times recorded as only two miles, it appears that its course is laid down on the map in the Monograph much too far to the eastward; it really left the Anagance about where the highway and railroad touch one another, and ran nearly true S. to the Kennebecasis somewhat east of the present highway road from one river to the other.

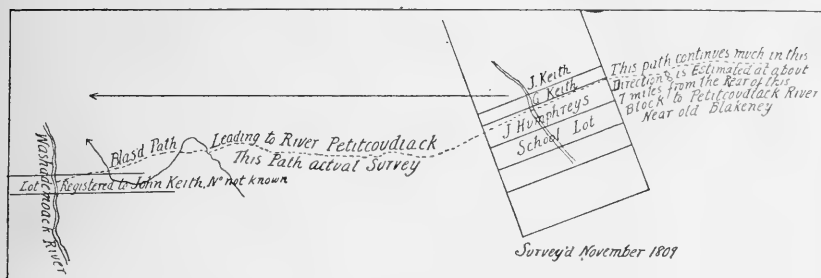


MAP NO. 6. FROM AN OLD PLAN; $\times \frac{5}{8}$.

- 247C. The course of the Washademoak-Petitcodiac Portage as here given, is, I am now convinced, erroneous. Its exact course has been given me by Dr. B. S. Thorne, of Havelock, who has heard of it from his father and uncle both of whom knew it when still a path. It followed almost precisely the present course of the highway road, leaving the Petitcodiac about two miles below the Anagance, crossing the North River near Bennetts Brook, and following the highway through Butternut Ridge; A mile or two from the Washademoak the Portage path diverged to the westward of the present road. At this place a great many relics of both French and Indian occupation have been found, and it appears to have been an important early camp site as mentioned earlier in these Addenda. Mr. Thorne's

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description of this route is fully confirmed by early plans I have since found in the Crown Land Office. One of these, given herewith, Map No. 7, a survey of 1809, shows in detail a survey of a blazed path from John Keith's lot on Washademoac through J. Humphrey's lot on the present Prices Brook, and thence to Petitcodiac "near old Blakeney." It is easy to show, by comparison of this with a modern plan, that this blazed path, without doubt the portage path, closely follows the modern road. An account of the old French route from Quebec to Beausejour via this portage is cited by Raymond, *St John River*, 112.



MAP NO. 7. FROM A PLAN OF 1809; $\times \frac{1}{4}$.

A reputed old French Road from the mouth of Anagance via Riders Brook to Cumberland Bay on Grand Lake is discussed later under the English period.

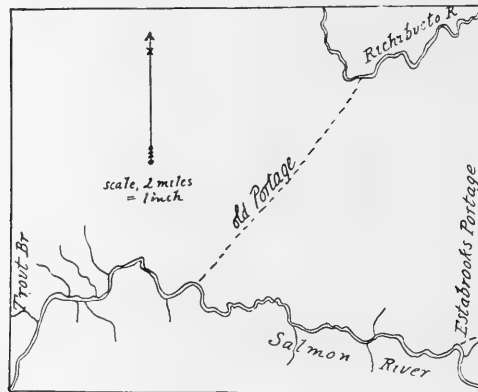
248. The **Memramcook-Westcock** portage is cited from a French document of 1753 by Raymond (*St John River*, 112). Its course is thus described in a newspaper article (*St. John Sun*, Aug. 3, 1904) "the trail of the Dorchester Indians was up the Palmer Brook, down Bulmer Brook, out to Wood Point at Sackville."

The portage from Salisbury or Rougie Bay to Shepody waters is mentioned in the Calhoun Diary of 1771, as running from the river just west of Cape Enrage into Shepody River. This, however, must have been in addition to a portage from Waterside directly to the Lake.

248. There are references to the **Salmon River-Richibucto** portage in Baillie's *New Brunswick*, 39, and in Cockburn's Report of 1827, 91, where the length is given as 220 chains. Perley, in the "*New Brunswick Courier*" for Nov. 18 1837 tells of passing over this portage, which he gives as three miles long. He also describes the long portage, nine miles long, apparently used when the water was low, and its course is shown on a plan in the Crown Land Office. Another plan given herewith (Map No. 8) showing the short portage in some detail places it a little west of the course shown on the map in the Monograph, leading from close to the mouth of Cordie Brook directly into the angle of the Richibucto.

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- 248B. **Washademock (Canaan)-Buctouche.** The precise location of this portage, well-known by tradition to residents on the Canaan, is happily made certain by a plan in the Crown Land Office, (which I had previously overlooked) and shows it as on the accompanying map (Map No. 9). This plan and the modern published maps by no means agree in details, but as nearly as they can be correlated, the portage must have followed very clearly the present highway road from its crossing of the North Branch Buctouche to the southerly branch east of Canaan Station. The portage is said to have been three miles in length, but this map makes it much shorter.



MAP NO. 8. FROM A PLAN BY LAYTON; $\times \frac{3}{10}$.

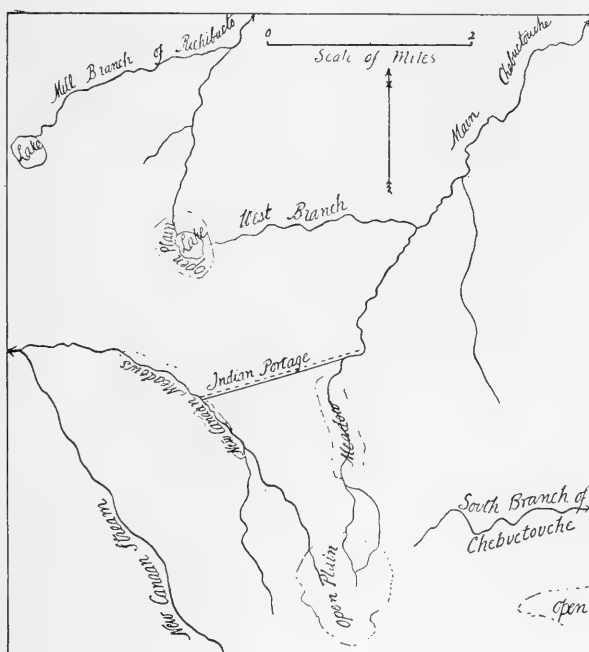
249. The important **Misseguash-Baie Verte** portage apparently did not start at the present Portage Bridge, but from the first cove to the eastward of it. This is made clear by the fact that the official declaration of the boundary between New Brunswick and Nova Scotia makes it start from the portage, and Munro's map (reproduced in the Boundary Monograph, 370) shows the boundary starting not from the bridge but from the head of the cove next east of it.
250. There is an old plan in the Crown Land Office showing a road direct from Fort Moncton through to "Musquash or Portash Lake," which may possibly, though this is unlikely, indicate an Indian trail. In any case the use of the name *Portash* lake for this lake on the Tantramar is of interest as showing some early portage by this route, even though it may have been an early road of the whites.

The existence of a **Tantramar-Aboushagan** portage or trail is rendered likely by the name Aboushagan itself, the termination of which strongly suggests *owokun*, a portage.

A reference to the use of the **Memramcook-Scadouc** portage is in Murdoch, Nova Scotia, II, 495. The probable route of this portage is shown by the very detailed map of 1846 by Crawley showing the route surveyed for a possible Memramcook-Shediac canal a part of which is given herewith (Map No. 10).

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251. The Gaspereau-Cains River portage is also mentioned in Cockburn's Report, 92, and in Baillie's New Brunswick, 38. It is said locally that the route led up six-mile brook making the carry only two miles (Notes in "Chatham Advance" after March 1, 1897), but this must have been a high-water route only, since Marston speaks of it as seven miles long in his MS. Diary (Coll. N.B. Hist. Soc. II, 103). Though of so much importance in the early settlement of the Province, it appears to be shown accurately upon no early map, and the only map that I have been able to find which marks it at all is a sketch by Harley in his 1826 map of Cains River. A portion of this map is given herewith (Map No. 11) with the corresponding survey from



MAP NO. 9. FROM AN OLD PLAN; $\times \frac{1}{3}$.

Fairweather's plan of 1836, upon the same scale. If Harley's distances are accurate, (as his location of a timber-berth on the map would seem to imply) it would show that the portage left Cains River about as I have indicated on the Fairweather map, in which case it is put somewhat too far to the eastward on my map in Historic Sites, 251.

251. The suggestion of a portage from Black Brook to Barnabys River is confirmed by a corrected copy of the Franquelin deMeulles map of 1686 which I have received from Paris (Map No. 26 of preceding Cartography). It shows the continuous line, used in that map for a portage, from the head of Black Brook to the head of Barnaby

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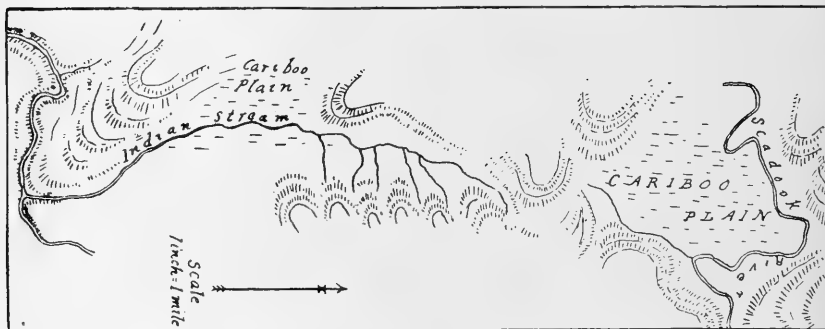
River. I find also that the latest plans in the Crown Land Office show these waters approaching very near one another.

I have been told by a resident that there was formerly a trail, "Sock Renou's Trail," from Indiantown apparently to the Little Southwest.

The Nashwaak-Miramichi portages from Cross Creek to near Boiestown, are very clearly shown in detail on one of the road maps in the Crown Land Office.

252. **Long Lake to Little Southwest Miramichi Lake.** This portage path, traversed by Hind in 1864 has now completely vanished. I have myself crossed from Long Lake via Milnagek to Little Southwest Lake with a companion on a trail in part made by hunters and in large part made by following an old pine-road. (Compare in Bull. N. H. S. IV, 461, 468)

I have also, aided by one companion, portaged canoe and outfit from Tobique to Little Southwest Miramichi waters, making our



MAP NO. 10. FORM CRAWLEY'S SURVEY OF 1846; $\times \frac{1}{2}$.

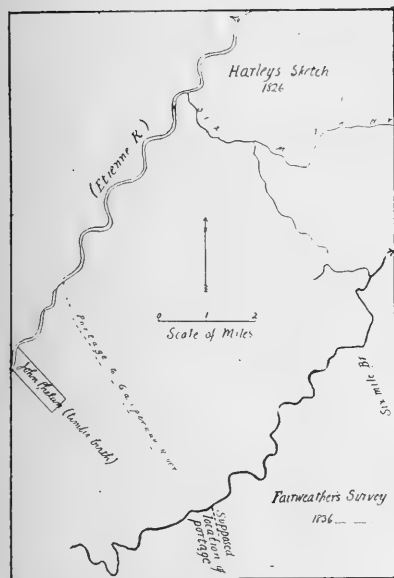
own trail, going from Portage Lake along the streams and ponds emptying into Adder Lake and thence across Upper Graham plain to Gover Lake, as noted in Bull. N. H. S., V, 329. Furthermore I have been told by Mr J. W. Hoyt of Andover N. B., who has run timber-lines in this region that the Indians have told him they had an ancient hunting trail from the Serpentine waters over Cow or Thunder Mountain to the Dunn Lake waters and vicinity.

It is also very probable that an ancient hunting-route of importance extended along the *Portage Brook*, a branch of the North Pole Branch, heading over near Mitchell Lake of the Walkemik Basin (compare Bulletins of the Natural History Society of N. B., V, 338 and 466). The North Pole is a remarkably easy and beautiful canoe stream, while the Little Southwest Miramichi above the North Pole is extremely rough and difficult. The North Pole and Portage Brook therefore offer a far easier route to the lakes of the Walkemik Basin than does the Little Southwest and the Walkemik itself. The name Portage Brook, however, was given by Mr. Henry Braithwaite, as he tells me, because of his own use of it as a portage stream on one occasion.

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253. Somewhat over a mile east of Kouchibouguac Village, there empties into the Kouchibouguac River on the south side a small brook, at which apparently, is marked on an old plan in the Crown Land Office the words "Indian Portage," while the brook itself is called "the brook at the Indian Portage" in a grant of 1809. Since this place is within tide waters, it cannot indicate a portage along the river; but it may mark the beginning of an old portage to the Kouchibouguacsis. Possibly this was part of the route from the Aldouane to the Miramichi mentioned by Denys.

255. The Miramichi-Nepisiguit route along the remarkable lagoons of this coast is mapped and described in some detail in my edition of Smethurst's Narrative of 1761 in the Collections of the N. B. Historical Society, II, 370, 373. But since that work was published I have gathered much additional information upon the subject, and have been able again to visit this interesting region, (travelling, as was appropriate, by canoe), and to inspect in person the route of nearly all of the portages.



MAP NO. 11. FROM PLANS BY HARLEY
AND BY FAIRWEATHER; $\times \frac{1}{32}$.

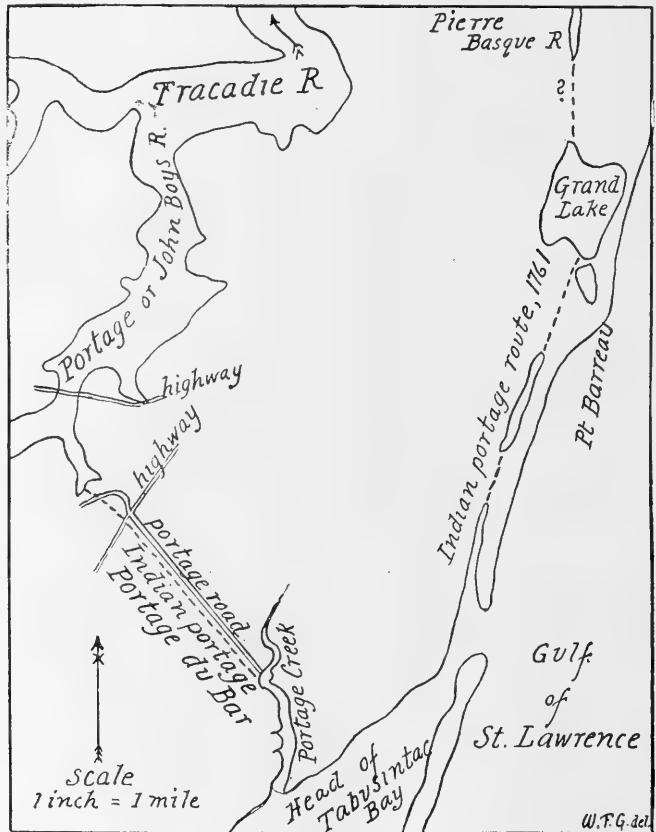
From Miramichi Bay to Tabusintac the route along shore inside the "beaches" is entirely unobstructed, so that no portage is there needed. But I believe that a portage, or at least a trail, existed from the vicinity of the important Indian settlement of Church Point through to Stymest's Millstream, which is near to another important village site at Cains Point. Thus I have been told by an Indian at Burnt Church that such a route started up Reserve Brook and ran from Neguac to the little brook now called Portage Brook on some plans, (Stymest's Millstream being the next stream to the westward). I find, however, that the earliest map of this river, that of 1804, applies the name Portage River, to Stymest's Millstream, leaving

the present Portage Brook unnamed, while the Stymest grant of 1814 speaks of the Millstream as "commonly called Portage River". Hence it seems altogether likely that the Indian was correct and the white man in error, and that the portage really ran to Stymest's Millstream, though it is of course possible that it had a branch to Portage Brook. The name Portage was probably transferred to the brook after the Millstream acquired its present name. The topography of the region would, however, seem to favour Neguac Brook rather than Reserve Brook as the starting point of the route, in which case the portage would have followed the general route of the present highway road.

From Tabusintac to Tracadie there were at least two routes, (a) that through the ponds inside the beach, including Grand Lake,

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taken by Smethurst and fully described and mapped in the publication above cited, and shewn on the accompanying Map No. 12; and (b), that from Portage Creek at the head of Tabusintac Bay through to the cove on Portage River, a route taken by Plessis in 1812. This route has been described to me by an intelligent old Indian (Joe Prisk, or Presque, of Bathurst) who had been over it in his youth, and the white residents also know it by tradition. The original Indian path has vanished, having been early replaced by the road now running



MAP No. 12. COMPILED BY THE AUTHOR.

in nearly a straight line over gently rising ground between those waters, and early constructed to permit winter travel from one of the bays to another. From an examination of the ground I have no doubt the original path left Tabusintac waters exactly where the road now does, (for here Portage Creek swings close in to a bit of elevated upland forming an admirable landing and camping place with a cold fresh water brook just above, a better place than exists anywhere for a considerable distance above or below it), and ran

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towards the cove at Portage River somewhat to the southwest of the present road, reaching the cove at the elevated ground still used as a canoe landing there. Its general route is shown on the accompanying Map No. 12, which shows also its starting point from Portage Creek, which is copied from an old plan in the Crown Land Office.

I have also been told by an old Indian at Church Point that a portage existed from a small brook, apparently Cowassiget, to the Portage River; but his knowledge of the subject seemed to me too uncertain to be trustworthy.

The portage from **Tracadie to Pokemouche**, which I find is known by tradition to residents in the vicinity as well as to the Indian Joe Prisk, ran from near the extreme head of Tracadie Bay across a low country, less than two miles, to the Southeastern extremity of the South River of Pokemouche as shown in the map in my edition of Smethurst's narrative. Very near the head of Tracadie Bay is a little brook, up which a canoe can be pushed through a marsh, and where probably the path started. The South River ends in an extensive bog, just before reaching which as one ascends it is a tiny cove coming close against the upland on the south, and here I think in all probability was the other end of the portage. The old path, which is said to have been about two miles long, has vanished here also, being replaced by the road from Green Point settlement, near by, to the Pokemouche waters. This route, no doubt taken by Smethurst in 1761, would be that followed by travellers going up the Pokemouche waters; if simply proceeding along the coast they would of course go along the shore outside if weather permitted, and if it did not, they could carry along the beach from Tracadie Bay, past Green Point settlement, and I have been told both by an old resident of Green Point and by an Indian that Indians travelled that way in former times. But it is possible that yet another early portage existed between Tracadie and Pokemouche waters, for early plans name the brook now called Peters Brook, *Waganchitch*, which means "the little portage," though others mark it as *Indian Cove*. Possibly however the name refers simply to the early portage road cut from Caraquet to Tracadie, which crossed the Pokemouche here and continued up this cove.

From **Pokemouche to St. Simon** there appear to have been at least two portages. The westernmost was that which I have worked out (and mapped) theoretically as extending from a branch of Waugh River to River Brideau, probably that taken by Smethurst in 1761. Its course is marked upon the map in my edition of Smethurst's narrative.

I have since been able to examine this route at both ends and I find that an old portage road, said locally to have been made by a lumberman named Welmer, and still partly in use, starts from the Western extremity of the branch of the Waugh and extends across over open barren and through woods two miles or more to the River Brideau, which it reaches as shown on Map No. 33. This seems to be the road locally called "Pokemouche Port-

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age" I think it wholly probable that this road follows the general route of an early Indian portage though I have not been able to confirm this either from residents or from the Indians at Bathurst. The other led from the lower Pokemouche to the South Branch of St. Simon. I was told by more than one old resident that it crossed the open barren from the part of Pokemouche Bay called on the maps Musquash Cove to St. Simon; but Joe Prisk told me that he has used it in early days, and that it ran from a cove near the Ferry (viz. the present highway bridge), followed the present highway to opposite St. Simon waters, and then turned directly down to the latter. We probably have here another case of the early abandonment of the original Indian paths when the first roads in their vicinity were built, as earlier discussed, and it is altogether likely the original path was by the shorter route from Musquash Cove. It is possible that there was also a portage into Little Pokemouche, for use in travelling along the coast, and perhaps one extended from Little Pokemouche into St. Simon.

From **St Simon to the Caraquet** region travel was no doubt chiefly along the coast by the sheltered route of the Little Pass. (Map No. 33). But for reaching the upper part of St Simon from Caraquet, the Indians appear to have had another route via the *Portage Brook* at the northern bend of St Simon shown on Fergusons map of 1820 (Map No. 33). Upon another old plan in the Crown Land Office, one of 1832, a path, or road runs from Caraquet directly south to this brook, and beyond it to the L. Mailliou lot, and very likely represents in part the original portage path. The path seems now abandoned, but apparently ran somewhat east of the present railway. The route, however, could not have been much used, or it would no doubt have been taken by Smethurst's Indians in 1761.

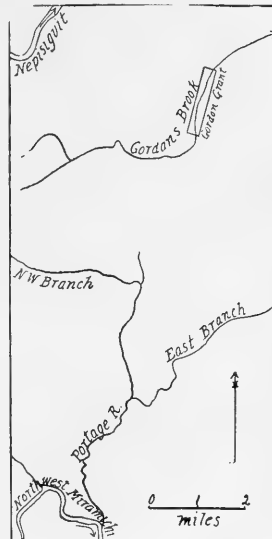
The "portage" from Caraquet to Pokemouche, making those places three or four leagues apart, mentioned by Plessis in his journal of 1811 (page 107) was of course not an Indian route, but a road or path through the woods made by the white residents, and it was probably along the route of the present highway between those places. Another early road of this kind, seemingly now abandoned, existed from Caraquet to Pokemouche River which it crossed at Peters Brook, and continued on to Tracadie. It was perhaps the presence of this road, and not an Indian portage, which gave Peters Brook its Indian name of *Waganchitch* or "Little Portage."

From **Caraquet to Bathurst** the natural route of Indian travel would be, apparently, along the coast. But this is a very dangerous journey for a canoe because of the great cliffs, extending along this exposed coast, and excluding any possibility of landing for miles together. It is not impossible therefore, that some route by way of the Caraquet River and its branch Innishannon Brook, with perhaps Teagues Brook, may have been utilized to avoid this dangerous coast. But I have found no trace of such a route.

But in addition to the route along-shore and through the lagoons from Miramichi to Nepisiguit, it is altogether probable there was

another route by way of the Tracadie River into Bass River or Teagues Brook. Such a route would be indicated by topographical probabilities as at least used in travel from Tracadie to Nepisiguit, though I have not been able to find any direct tradition or other such evidence for it aside from the unsupported statement in Slafter's Champlain that such a route existed. As I have found by a trip of my own on the Tracadie, and as described, with a map, in Bulletin (Vol V, 433) of the Natural History Society of N. B., this trout-famous river is readily navigable for canoes, with only a few short shallow reaches, completely to the extreme head, even the uppermost waters of the main stream being formed of meadowy deadwaters very easy for canoe travel; and it was no doubt more easy of navigation before the days of lumbering, as earlier noted. These deadwaters swing much nearer to Bass River (within two or three miles at most) than our printed maps show, and hence an easy route is afforded to Bass River, which however is said to be difficult for canoe navigation at low water. But I have also found in my own visit, that the waters of the Little North Branch have this same meadowy character, and to a point which, as I have been informed by a lumberman who knows the region intimately, reaches within about a mile and a half of Taegues Lake, whence it is only some six miles to the salt water. The little North Branch with Teagues Brook would thus form a shorter route than that by Bass River, and as well, avoiding a two-mile shallow reach above Little North Branch, it would form a much easier route. Very likely, it was thus used, though such a route now seems locally unknown.

- 255B. **Portage River-Gordon Brook.** Important as this route was, it nevertheless appears not to be shown upon any existent map. Its general location, however, would seem to be indicated by the topography of the accompanying map (Map No. 13) a copy from the Timber line map in the Crown Land Office. All the lower part of Portage River, as I have seen, is a very meadowy quiet stream mostly very easy of canoe navigation, and I have been told that Gordon Brook has much of the same character. The only direct mention of the route I find on any map is on the plan of the Gordon Grant, (shown on the map) of 1822, on which the brook flowing through this grant (which embraces extensive meadows) is named "Indian Portage Brook to N. W. Branch Miramichi," while on the brook above this grant is marked "Brook to N. W. Miramichi," showing that the portage started above the grant. Probably it crossed from the southerly bend of Gordon Brook to the angle of the N. W. Branch of Portage River.



MAP NO. 13. FROM A
MODERN PLAN; $\times \frac{1}{10}$.

The course of the trail from *Nepisiguit to the Northwest Miramichi* by Emerys Gulch, said by guides to have been used by the Indians,

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is shown on a map in the Bulletin of the N. B. Nat. Hist. Soc. XXII, 216. Also I have found a note given me by the late Michael Flinne, showing apparently that the Indians knew of this portage, and had a name for it, which he gives as *Es-kut-da-gum-mooch-wa-ga-dik*.

The portage mentioned by Hardy in his Forest Life in Acadie, 240, is probably that by Portage River.

It is also very probable there was another portage between these waters, for, as shown by the map just cited, there is a very short distance between the source of the Northwest Miramichi and the upper part of the South Branch of Nepisiguit. I have myself portaged through this way. (Bulletin of the N. B. Nat. Hist. Soc. XXII, 216).

256. A MS. plan of the disputed territory, by W. Anson, 1839 (1841) in the Crown Land Office marks a portage from Grand River to Restigouche several miles east of the Wagan portage; but it is likely a mistake.

The mention of a route from the Madawaska River to Bay Chaleur in Fisher's "Sketches of New Brunswick," 27, must be an error; such a route is only possible by a very roundabout course.

256. The **Green River-Kedgewick** portage has been several times surveyed, and has been mapped with the greatest minuteness in connection with boundary surveys made between 1820 and 1842. Thus it is described fully by Tiarks in 1820 in his report embodied in the "Case of the U. S. laid before the King of the Netherlands," and it is shown in the utmost detail in the fine map of Green River made by the American Surveyors in 1842 (now in the Department of State at Washington).

There are references to the long portage between the Little Tobique and the West Branch of Upsalquitch in the Bulletin N. B. Nat. Hist. Soc. No. XXII, 180. There is an obscure reference to it in Baillie's New Brunswick, 93. Mr. W. H. Venning has told me that it was formerly known to the Indians and that it reached the Little Tobique at the angle of that stream.

I have also been told by a reliable Tobique guide, who knows the country well, that there was formerly "a place where they used to lug across," starting ten miles up Big Cedar Brook and running across to a branch of Restigouche, he thinks Five-finger Brook, a distance of about twelve miles.

The Indian name of Stillwater Brook on the Restigouche is *Med-au-an-e-gan-uk*, meaning carrying-place (containing the root, on-eg-un = a portage). This perhaps indicates a portage to a branch of the Southwest Branch Upsalquitch.

The principal **Nepisiguit-Upsalquitch** portage, by way of Upsalquitch Lake, is fully described and mapped in the Bulletin of the N. B. Nat. Hist. Soc. XXI, 77.

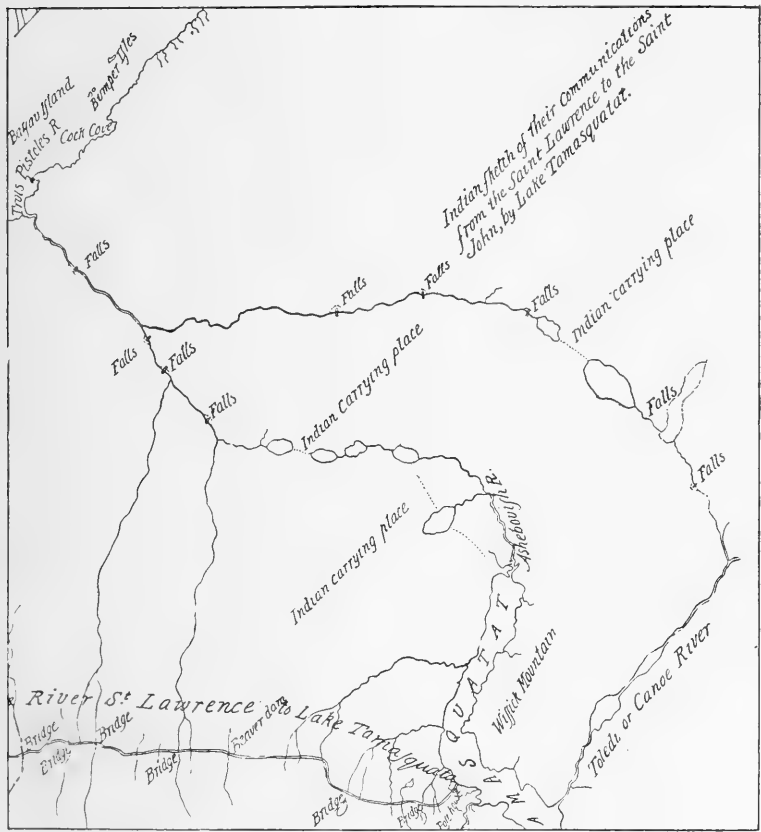
257. The **Patapedia-Metis** portage and the rivers are fully described by Richardson in the Report of the Geological Survey for 1858, 119.

The **Touladi-Trois Pistoles** route is mapped completely from Indian Reports on the valuable Sproule map of 1787 reproduced herewith (Map No. 14).

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There was also a portage route from Lac des Aigles into the Touradif branch of the Rimouski, as shown by Greenleaf's map of Maine of 1844, and by Tiarks account of his visit in 1820, in his Report in the "Case of the U. S. laid before the King of the Netherlands."

The **Ashberish-Trois Pistoles** route is fully mapped on the Sproule 1787 map, (Map No. 14). This map, in conjunction with Pote's journal shows that Pote was taken to Quebec by this route, not by the Touladi route as the editor of the Journal supposed. The proof of this is found in the fact that they made a portage directly



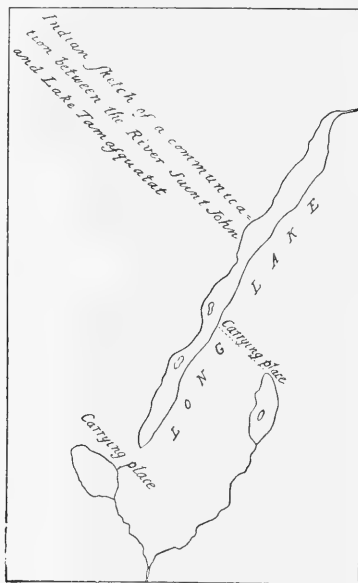
MAP NO. 14. PART OF THE SPROULE MAP OF 1787; $\times \frac{1}{4}$.

from Lake Temiscouata, which is necessary by the Ashberish route, but not by the Touladi route; for the latter stream is, except for a small fall near its mouth, easily navigable at all seasons far up its course, as I know personally from having been along it.

The portage on Greenleaf's map of 1844 from the head of the west branch of Green River into Rimouski is a mistake. Tiarks went through that way in 1820 but his report makes it clear there was no regular portage.

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Baker Brook-Cabineau. The Sproule map of 1787 shows an "Indian sketch of a communication between the River Saint John and the Lake Tamasquatat," via Baker Brook and Cabineau (called by him, Namjamscutcook). (Map No. 15). Two portages lead from Baker Brook into Long Lake, probably following the course of the portage road of the geological map, one apparently from Baker Lake and the other from Meruimticook Lake, by a route not known to me. Probably it was not used as a trunk, but only as a hunting, route, since it was as long as, and must have been much harder than, the very easy route by the Madawaska.



MAP NO. 15. PART OF THE SPROULE MAP OF 1787; $\times \frac{1}{4}$.

259. Several of the portage routes between the upper St John and the St Lawrence were explored by the surveyors in 1816-1828 in connection with the boundary disputes, as shown in the abstracts of their reports contained in the "Case of the United States laid before the King of the Netherlands."

The **Black River-Ouelle** Portage is shown perfectly on a map in the State Department at Washington, running from near the head of the middle of the three branches of Black River (Raglan of Wilkinson), through to a lake on a branch of the Ouelle. The same portage is shown less perfectly on Greenleaf's map of 1844.

...etarmejette. This portage is often mentioned in documents relating to the boundary disputes. Its location is approximately shown on Wilkinson's map.

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262. **St. Croix Island.** This very important locality has been fully treated in the Monograph entitled "Dochet (St Croix) Island,—A Monograph" in these Transactions, VIII, 1902, ii, 127. Some addenda et corrigenda should here be recorded. The page references following relate to the special Monograph.

(128) This map, owing to misinterpreted local information, places Johnsons Cove too far north; it really belongs to the cove next south of it, while the one here called by that name seems to have no local name (129). I find on a subsequent visit that my map is not exact in outline of the reefs, though there is only one material error; I have made them broad just south of Wrights Nubble, whereas they are there somewhat constricted, expanding again east of the constriction, to form the part on which the Cannon Nubble of Champlain's time stood.

(142). At the Ter-centenary Celebration at the Island on June 24, 1904, a resolution was proposed and adopted to call the Island henceforth by its original and historic name, *St Croix Island*. Certainly this is most desirable, and I for one, will do what I can to aid it. But whether local usage can be changed is, I think, somewhat doubtful; those who celebrate the four hundredth anniversary will be able to tell!

(152) To the less important literature here cited may be added the account of the settlement in the "Stories of New France," by Miss A. M. Machar, though the author apparently supposed that Navy Island near St Andrews was St Croix Island. Also I have seen another poem, inspired by the story of the island, published some years ago in a newspaper (identity and date not known to me) and signed C. H. A. which is really excellent. Literature of another kind was called into existence by the celebration of the Ter-Centenary of the Island's Discovery on June 25, 1904. A full account of the Celebration is given in the *St. Croix Courier* for June 30, and an official account, with the various addresses and appropriate illustrations, was published in July 1905 by the Maine Historical Society, (Ter-Centenary of De Monts' Settlement at St. Croix Island, June 25, 1904. Portland, Maine Historical Society, 1905, 78 pp). There is also valuable matter in *Acadiensis* for July 1904 (special Champlain number) for Oct. 1904, and in a little Souvenir Programme issued at the time, at St. Stephen.

(154) As pointed out in a review of this work in the "Review of Historical Publications relating to Canada" for 1904, page 19, the boat in which the party explored the Bay of Fundy and discovered the Island should be called in English a "long-boat" and not a barque. It is shown, without doubt, in the picture on the map on page 157.

(168) On the site of these gardens, especially on the Canadian shore, see under page 266 later.

(169) The negro mentioned in the footnote is said locally to have been a smallpox victim, hence his burial here.

(173) The "seventeenth" of March should read the *seventh*.

(174) Lescarbot was in Acadia only one year,—1606-1607, not two.

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(182) In Haliburton's History of Nova Scotia (I, 18, followed by Gesner's New Brunswick 15) it is said that the chapel was "built in the shape of a bower, the sides and roof of which were supported by living trees." I do not know the basis of this statement and think it must be an error.

(184 and 177) As pointed out by the reviewer of this Monograph in the "Review of Historical Publications relating to Canada" for 1904 (page 20), I have mistranslated the word *pardeça*, thus making the "Master William" pamphlets belong to St. Croix Island whereas they really were prepared in France. The Reviewer's translation of this passage is as follows:— "and they had not done badly to lodge themselves and clear the island before winter set in, while on this side the ocean [i.e., in France] news-letters were distributed over the signature of Master William, a farcis of all kinds of reports, wherein this prophet among other things reported that the Sieur de Monts was busy clearing his path in Canada." In making my translation I was puzzled by this passage, and turned for aid to Erondelle's translation which reads "whilst that in these parts pamphlets were set out under the name of *Maistre Guillaume*," etc. I assumed that these parts referred to St Croix Island, overlooking the fact that *pardeça* could not have that meaning. Hence it is clear that it was not at the St Croix island the "pamphlets" were circulated. I have emphasized this error, unfortunately, in my address delivered at Calais, June 25, 1904, and published in the St Croix Courier of June 30, and in the Maine Historical Society's Account of the Celebration.

(184) The review above cited thinks the passage beginning "For the malediction and rage" etc. probably means no more than a reference to the cruel treatment which the European nations then meted out to each other when they met outside of Europe.

(188) Under "amusing pamphlets," see the note under 184 and 177 above.

(191) It seems very likely it was Father Aubri (who had been lost for a time at St Mary's Bay Nova Scotia) and a Protestant minister who were buried in the same grave at St. Croix Island. This seems substantiated by Lescarbot who says they had quarrelled about religion (Otis-Slafter, translation of Champlain, II, 20); note also Parkman, *Pioneers of France*, opening of Chapter 3 of Champlain part.

(194) As pointed out by the reviewer above cited, the translation (taken from the Jesuit Relations) of *qu'il y estoit resté luy cinquieme*, is not correct, and it really means that Captain Platrier was spending the winter there with four other men.

(212) The tradition that Haliker was a resident of the Island receives full confirmation from the following entry in the Land Memorial Records of the New Brunswick Legislative Council, preserved at Fredericton. Under date Nov. 18, 1820 is the following entry;— "John Hiliker asks a letter of occupation of an Island called St. Croix, between the U. States of America and this Province, until wanted by Government." It is endorsed "Recommended." It is

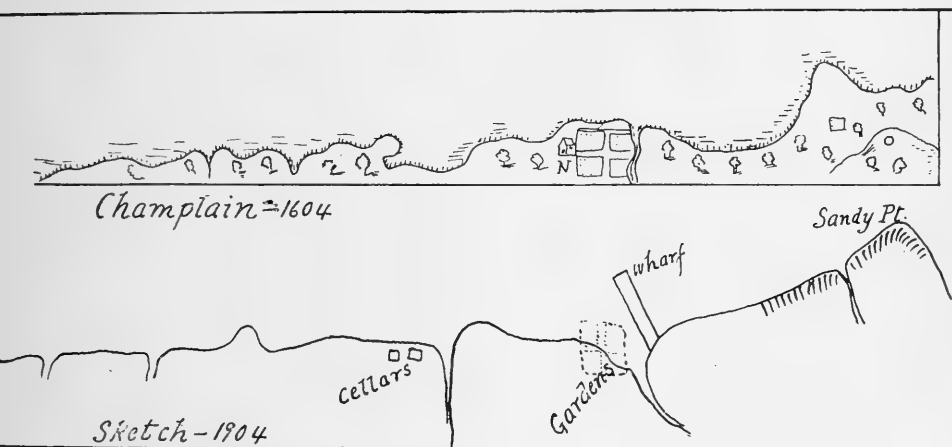
Historic Sites.

of interest to note that this was the same year in which the Island was granted by Massachusetts to John Brewer. Locally a legend of the Enoch Arden type is told of Haliker and his wife.

(220) The wish here expressed *was* almost a prophecy, as evinced by the very appropriate and successful celebration held at the Island on June 15, 1904. A very full account of the proceedings is contained in the Ter-Centenary volume published by the Maine Historical Society, as noted on an earlier page. It may be added that the inscription on the bronze tablet dedicated that day was composed, with some suggestions from the Committee in charge of the celebration and others, by Mr. James Vroom of St. Stephen, N. B.

(221) As to the outline of the ledges near Wrights Nubble, see the earlier note under page 128.

266. **De Monts' Gardens below Sandy Point.** Beside a little rivulet south of Sandy Point a piece of land was cleared by De Monts in 1604 and



MAP. No. 16. TO SHOW THE LOCATION OF CHAMPLAIN'S GARDENS.
THE UPPER IS FROM CHAMPLAIN'S MAP OF 1613 ($\times \frac{5}{8}$); THE LOWER IS A SKETCH BY
THE AUTHOR, 1904.

planted as a garden. The chief evidence as to its location consists of Champlain's map, (reproduced in part in the accompanying Map No. 16), but unfortunately the map is not sufficiently accurate to enable the location to be fixed at once with certainty. Below Sandy Point there are actually two small valleys, (aside from a deep gully on the point itself), both dry in summer though having small streams in wet times, either of which might correspond with the stream shown on Champlain. After very carefully examining the ground, however, I have concluded the gardens were beside the uppermost of the two streams, and for these reasons. First, the ground beside the upper valley, which is larger than the lower, is a low gently-sloping upland of excellent soil, now a good hayfield, while the corresponding ground beside the lower valley is a much higher, rougher, clayey and

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stoney pasture, much less fitted for a garden. The two cellars at the latter locality no doubt are relics of the first modern settlement of this coast, and have no connection with the little cabin shown on Champlain's map. Second, it is readily possible to identify the point and two little rivulets shown by Champlain on the left of his map, (compare Champlain with my sketch in Map No. 16); if this identification be correct, the relative distances mark the upper rather than the lower valley as corresponding to that shown on Champlain. In this case the lower valley is omitted from Champlain, where it should occur about in the cove just east of the cabin and letter N. In comparing however the outline of the coast it must be remembered that this shore has sunk several feet, probably five or six, since the time of Champlain, allowing the lower parts of the upland to be washed away and greatly altering the configuration of the shores. If now we suppose that a considerable section of the low upland just beside the upper valley has thus been removed, it would make the configuration agree much more closely with the map of Champlain. This would bring the Gardens in part upon the present beach as shown on the map, and I believe such was their true position.

266. **St. Aubin.** The exact site of St. Aubin's residence, (and consequently the limits of his seignior) is not known. The fact however, that his residence was at Passamaquoddy and that the name Passamaquoddy (see Place-nomenclature, earlier) applied originally only to the waters between Campobello, Deer Island and Moose Island (or Sowards Neck) would shew that it was in that vicinity, and not at St. Andrews or elsewhere on the Inner Bay. Hence it was likely at Campobello or Indian Island.

266. A statement made by James Boyd in 1763 (Kilby's "Eastport and Passamaquoddy," 106) seems to imply that French works existed on Digdeguash Island. But I have found no other reference to them.

In the same work, page 138, there are references to possible early French settlement at Shackford's cove near Eastport probably at the place so marked on the D. Owen map.

The remains of French settlement on Indian Island are mentioned by Lorimer in his "History of the Islands and Islets of the Bay of Fundy," 74.

The supposition that Gourdan and St Aubin were the same person is no doubt incorrect, since there was a Gourdan at this time in Acadia or Canada.

268. The traditional breastwork at Sandy Point is fully described in the Courier series, XXX, note.

An article in Scribners Monthly, XV, 449, (also in "Sport with Gun and Rod," published by the same company, Century Co., 172), mentions and figures a supposed old blockhouse somewhere in the woods of Charlotte Country, without doubt simply an old lumber-camp.

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In the St. John Telegraph in July 1895 it was stated that the lighthouse keeper at Letite (Mascabin Point) found relics of French and Indians about his house; that in a valley near by there is an ancient burial place which has never been disturbed.

269. The statement about the location of the settlement of de Marson is an error; he is here confounded with Martignon; the facts are given correctly on pages 277 and 309.

A French post provided with provisions for travellers, appears to have existed at Grand Falls in 1756 (Rameau, *Colonie féodale*, II, 374).

On the *French Village* at Kingsclear, compare Sproule's map given later (Map No. 38) and also the mention of these villages in the *Settlement-Origins*, 132.

270. The site of the Church of Ste Anne and of the French burial ground at Aucpac, Springhill, are still known locally, as I am informed by M. Mercure. Compare Raymond, *St. John River*, 145, 147.

The Acadian Settlement at St. Anne's Point seems to have been known to the English as Mercures Plantation or Settlement. (*Coll. N. B. Hist. Soc.* II, 160).

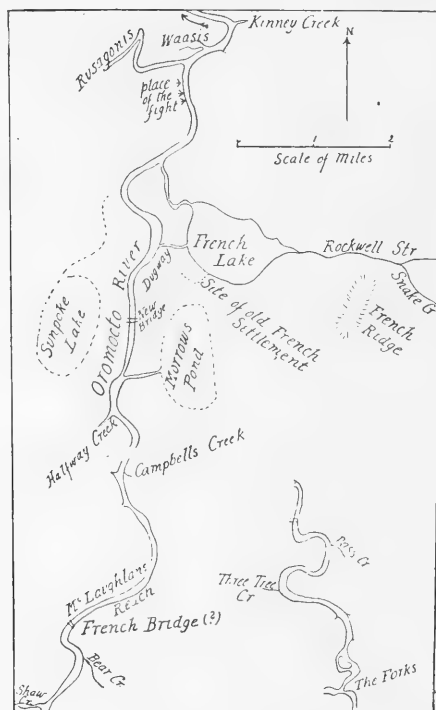
Cleancore, a name used on early plan for Eccles Island (see Map No. 38 of *Historic Sites*), and in the N. B. Council Records for 1788, was no doubt the residence of *Sieur de Clignancourt* about 1696. (Compare page 312 of *Historic Sites*). Rameau gives him as living near Aucpac (*Colonie féodale*, I, 322), and in a document among the Villebon papers in the Boston Public Library he is said to reside at a league from the fort at Nashwaak.

271. A French settlement appears to have existed at or near the Burton Court-house, as shown by a statement in M. H. Perley's *Lecture on New Brunswick* (*Educational Review*, IV, 173).

271. **French Lake** (Oromocto). As a result of a visit to this place in July, 1903, I was able to gather much information about the French settlements from the residents. The lake is very attractive, surrounded by gently sloping upland all around except on the west, where intervalle separates it from the Oromocto. The reputed site of the principal French settlement is as noted in the accompanying map (Map No. 17). The residents here point out not only the general site, but an exact spot traditionally called the site of the church (where faint outlines of a possible foundation may be traced), and another (now occupied by a great heap of stones) called the old French burial ground. Many relics have been found here and in the vicinity, such as dishes, blacksmith tools, bullets, coins, etc. These places, located by a simple survey in relation to existent buildings and to the great mill chimney (the mill burnt a few years ago) are shown by the accompanying map (Map No. 18). All probabilities seem to me to favour the correctness in general of the local tradition. A curious double line of stones running from near the church site towards the shore is of origin not known locally, but is probably modern.

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The "marked stone" shown on the plan is a supposed Indian carving mentioned earlier in this paper. Further, about a mile from the lake is another reputed French settlement called locally *French Ridge*, (see Map No. 17) where various relics, French and Indian, have been found. Further, according to a resident (Mr. T. E. Smith), "about twelve miles from the mouth of the Oromocto there seems to have been an attempt [by the French] to bridge that river with stones, which are visible to the present time, and what is the most curious thing there are no stones within five miles from the place where the attempt was made." The site of the "French bridge" was marked for me by a



MAP No. 17. COMPILED BY THE AUTHOR.

resident (Mr. Leslie Carr), as shown on the accompanying map (Map No. 17), but as Mr. Carr wrongly applies the names "Bass Creek" and "Three-tree creek" to the streams just above, and as Mr. Smith places it at twelve miles from the mouth of the river, it is more likely its correct position is as shown on the separate cut on the Map No. 17. There is also a local tradition that the French fought the English on the Oromocto below French Lake, and Mr. Carr has marked the reputed place on the map. This tradition fits in perfectly with a newly-discovered reference to an encounter between French and English described in Sergeant John Burrell's Diary of 1759, recently

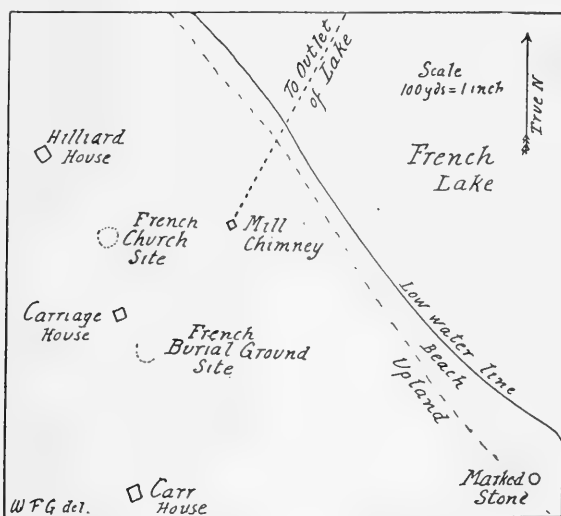
Historic Sites.

reprinted in *Acadiensis* (V, 291). Burrell was stationed at Fort Frederick, and his diary reads thus.

Wednesday 5th [Sept. 1759]—

our Cornel with two Captens and three Lewts and two Ensn. about 85 men went bye ye River this night. Tuesday 11th ye Cornel Returned with ye party of ye Scots up the River brought but a little Plunder for they were beat by ye enemy firing upon ye party as they were in a smali creek and kield Ensn. Tirrell and Corporall Shelden, John Ellis, Eleser Paks, and Elishu Randell, total 5, and wounded at ye same time Lewt Foster, Leonard, Commins, Isaac Palmer, Vine Turner, Ebenezer Kers, Solomon Maker and Isaac Torrey Total 7—all of Capt. Parker's company and one man of Capt. Garrashs.

It is not, of course, certain that this encounter occurred at this place on the Oromocto, but considering the local importance of the

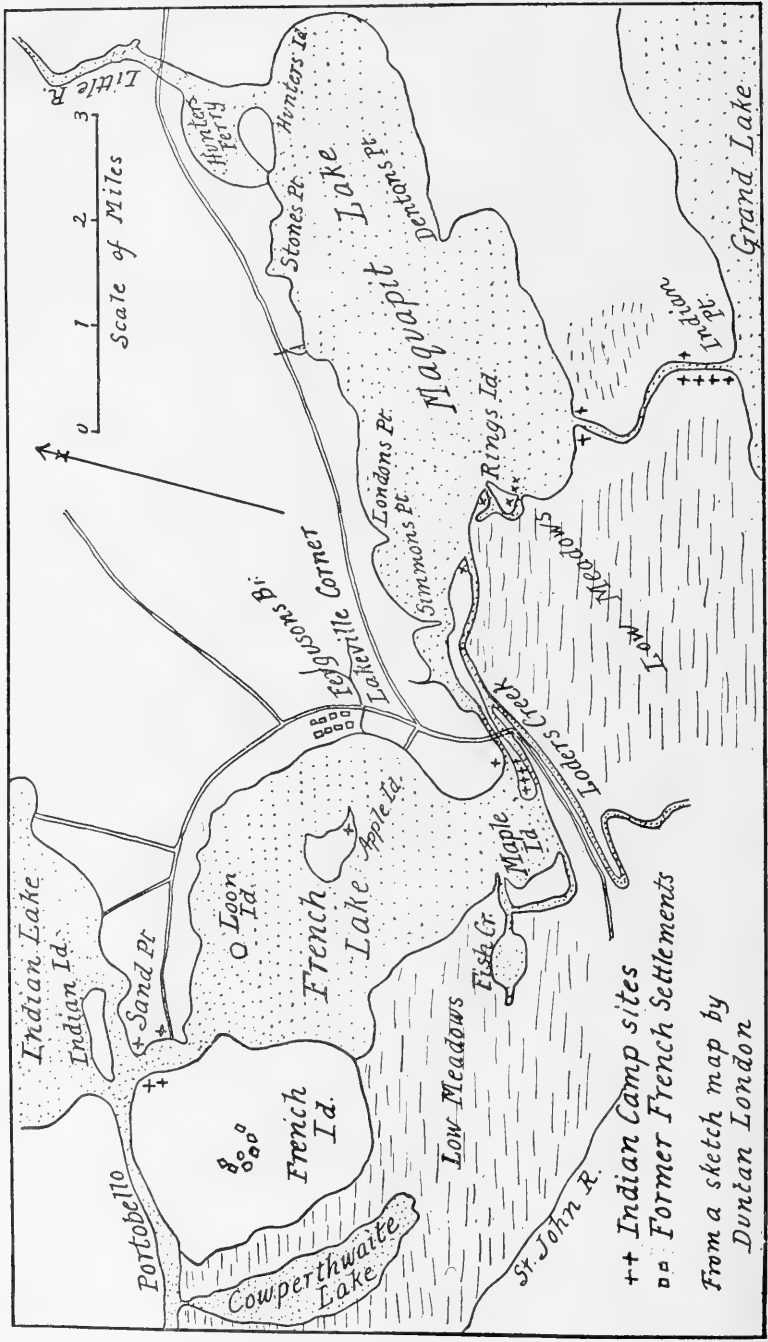


MAP NO. 18. FROM SURVEY BY THE AUTHOR.

event and that this is the only place to which such a tradition now attaches it seems highly probable, in which case it was probably the residents of French Lake who thus attacked the English in defence of their homes.

The Oromocto is navigable for large boats to above the Forks on both branches. Hence it is very likely the French settled in the retired position near the Forks, but I have no evidence of it.

271. **French Lake, (next Maquapit).** The sites of the French settlements here have been studied by Mr. Duncan London, of Lakeville Corner, and he has had the kindness to send me sketch-maps, from which the accompanying map (Map No. 19) has been compiled, showing their approximate locations, and some information about them. He says there were two French settlements on this lake. One was half a

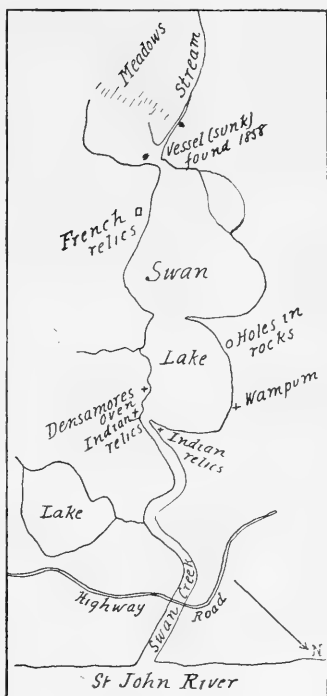


MAP No. 19.

Historic Sites.

mile from Lakeville Corner and consisted of eight or ten dwellings. The outlines of those sites were plainly visible a few years ago. The other was in the middle of French Island and was of about the same number of dwellings, which were disposed in a semi-circle around a well. "This well I have examined carefully and it seems to have been filled within a few feet of its top by its owners before they fled." He also says that cannon balls have been picked up on the shores of French Lake, and that he possesses a twelve-pound shot found there many years ago. No record exists to explain the presence here of these shot, but Mr. London says there is an Indian tradition that "Yinghe" (Col. Church?) fired them at the inhabitants here, while sailing up the river. But the distance from the St. John is beyond the range of the cannon of that day. Mr. London adds that he knows of no other French sites in that vicinity, but in the Crown Land Office there is an early plan which shows some distance up Little River, emptying into Indian Lake) this inscription.—"old chimneys and a high rock," which may indicate French houses.

272. **Swan Creek.** Concerning French relics at this place, Mr. London sends me the following information, illustrated by a sketch map herewith reproduced, (Map No. 20). He lived here in his boyhood and knows the locality well. He says that his father knew a place up the creek, (not known certainly to Mr. London), where the French had a blacksmith shop, as shown by coal cinders, old files, pieces of steel, scissors, tongs, etc. Also he found in 1858 the remains of a sunken vessel reputed French, at the place marked on the map. Further, a few years ago Mr. Amasa Coy, of Upper Gagetown, found half a ton of iron and steel instruments near the place marked "French Relics" on the plan.

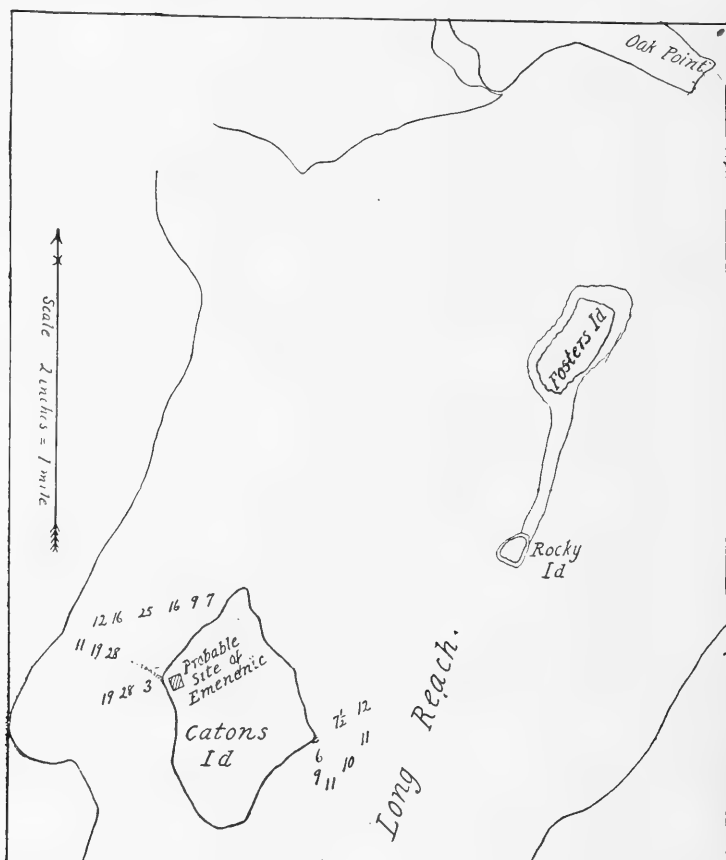


MAP No. 20.

272. **Coys Lake.** Mr. London writes me there was also a French site at the head of Coys Lake said to be well defined at the present time; I have not been able to obtain further information about it.
272. **The Mistake.** I have been told by my grandfather that he has himself seen an old wreck near the head of the Mistake, reputed French, from which many relics have been taken.

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271. **Emenenic**, the winter village of the French on the St. John in 1611-1612 mentioned in the Jesuit Relations and elsewhere. (For an account of events there see Raymond's "St. John River," 20, 128; Jesuit Relation, Thwaites' ed., II, 27). We know that it was on an island, and the fact that the Indians to-day call the three islands at the head of the Long Reach Ammenhennik identifies it as on one of them. But hitherto its site has been unknown. In July 1903, in company with



MAP NO. 21. FROM OWEN'S MAP OF THE LOWER ST. JOHN, 1846, $\times \frac{1}{3}$; WITH ADDITIONS.

Dr. G. U. Hay, I examined the three islands carefully to see if their configuration and local conditions would throw any light upon the question of the site of the village. Fosters (also called Jones Island or Isles of Pines) and Rocky Island connected with it by a bar, seemed to offer very indifferent situations; for a good site for houses, a good landing beach, a spring (here important since the river water is brackish), and a sheltered cove for anchorage, occur nowhere together. But on Catons island, at the western point, there is a fair situation

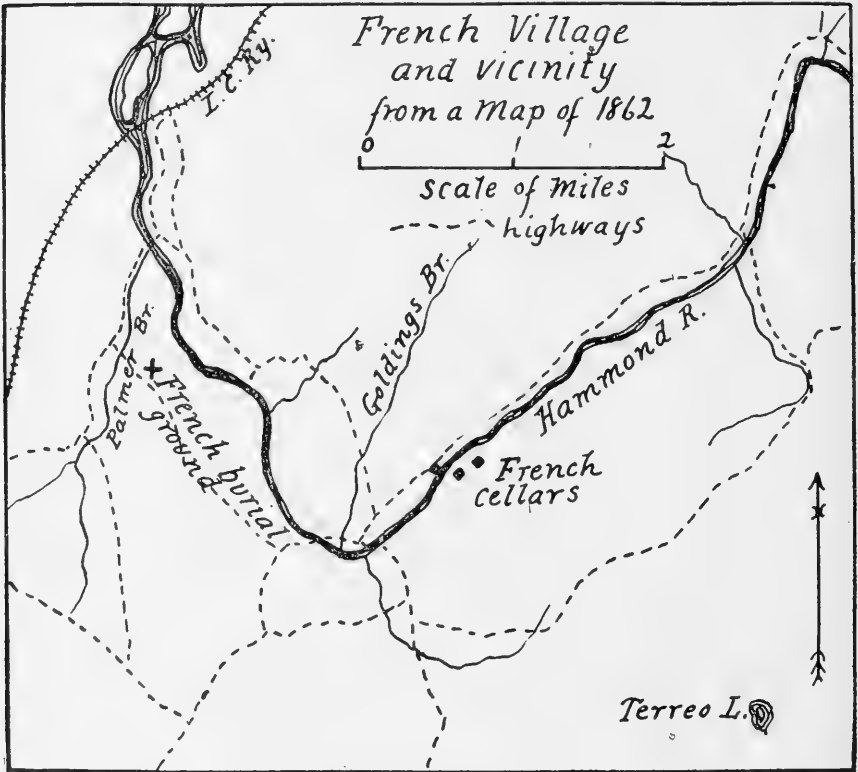
Historic Sites.

with a fine view both up and down river, at the place marked on the accompanying map No. 21. Here occurs a combination of advantages so great that in so far as such circumstantial evidence can fix a historic site, they fix the site of Emenenic here. At this place a long bar (more prominent than the map appears to show) runs off to the westward towards the mainland; but it ends abruptly, forming on both sides of it coves with deep water constituting an admirable sheltered anchorage. Further there is here a superb sand beach, springs issuing from the bank, and an admirable raised situation for buildings (on which now stands a house, the only one on the island). Further, the situation is one well-protected from the north winds by the lofty hills of the shore, here close to the island, and it slopes towards the southwest, a desirable situation for winter. The situation commands also a view down the entire length of the Reach. It is in all ways a charming, convenient and advantageous situation and far in advance of any other situation on the islands for a winter settlement, and I do not doubt it was the site of the village of Emenenic.

271. **Butternut Ridge and Canaan.** Reputed French settlements occur here, described thus by Dr. B. S. Thorne of Havelock:—"about one mile and a half North-East of the old Portage at Butternut Ridge (see Map No. 7), on the farm of Mr. Howard Hicks there has been a French clearing and garden: they have plowed up various implements, among them a cannon ball. At the end of the Portage at Canaan there are four or five hundred acres of intervale where they had gardens planted, with plum, gooseberry and currant bushes."
271. It is locally believed that Longs Creek, Washademoac, was first settled by the French. I have been told by Mr. A. N. Vincent, a former resident who knows the region well, that the first settlers found there at a place about half way up the present settlement, the remains of an old French house, clearing and stable.
272. **French Village, Hammond River.** The history of this Acadian settlement is given in the settlements Monograph. Through a kind correspondent, (Mrs. Noble Beatty, of French Village) I have endeavoured to find what traces of this settlement still remain. She tells me that the site of their old burial ground is known, upon the Ford place about two miles from Nauwigewauk Station, in the situation shown on the accompanying map (Map No. 22). This burial ground, according to a statement in *Acadiensis*, (VI, page 98 of Supplement) is now on the Provincial Stock-farm. The sites of their houses are known in a number of places along Hammond River, and particularly at the places marked on the map. The name of the lake, *Terreo* (viz. Therrieau) Lake, is of course another remnant of their presence. An old plan in the Crown Land Office shows the lots occupied for a time by them before they sold out to their new English neighbours and moved away to Madawaska. (See under this name in the Settlement-Origins). The village is shown, but in exaggerated and conventional manner, on the R. Campbell map of 1788.

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272. Many relics, reputed French, have been unearthed from time to time in Carleton. An early newspaper article I have seen, containing the reminiscences of an old resident, James Lane, "dictated to I. Allan Jack, Apr. 27, 1867," relates,—“I saw at one time on the present site of Mr. Adams mill forty boxes washed up, evidently coffins. Old Mr. Belyea, in the neighbourhood, dug up in his garden two or three bodies, some pipes, a stone hatchet and a gun.” This mill was situated somewhat north of Union Street opposite Guilford Street. More specific is an article in

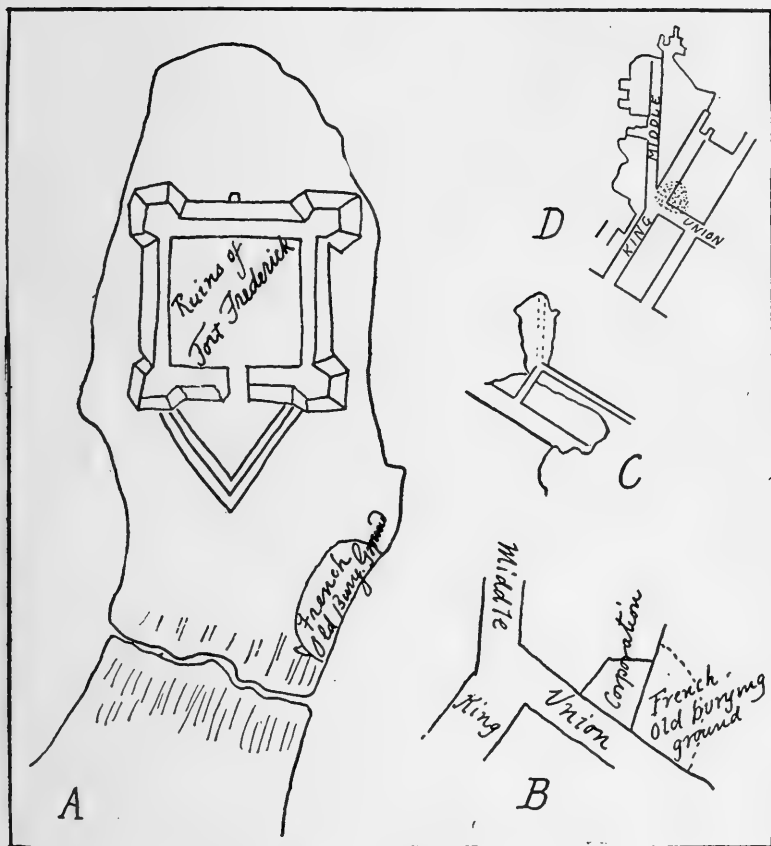


MAP NO. 22.

the *St. John Globe* for Oct. 5, 1889, which mentions relics found at the Old Fort "last fall," and adds, "King Street, directly above Middle, a short time since was graded, and during the operation the workmen came upon an old graveyard, presumably one of the French where a large number of bones were exhumed. Not long after that a heap of French army swords were come upon near the same spot." This discovery of the bones is confirmed by one of my relatives in Carleton who himself saw them. Happily we have more definite information as to the site of this burial ground. In the City Chamber-

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lain's Office at St. John are two plans which show its site, and both are reproduced, reduced, in Figure 23. Plan A is from George Sproule's plan of 1785 of Carleton, and shows the site of the "French Old Burying ground," "before the locality was disturbed by modern changes. The position and form of the burying ground, which probably stood upon a knoll, show that it was then being washed away by the sea, a fate which has overtaken many low-lying places on our steadily sinking coast; and it was no doubt much higher and larger in the



MAP NO. 23. EXPLAINED IN THE TEXT.

Acadian Period. The plan B is roughly sketched from another plan in the same office. The form given here to the Burying ground shows that it really swung towards Middle Street and under Union Street as well. Comparing this with C which is from the Admiralty Map of 1844, and this in turn with the modern map D, and taking account of the remains found on King Street above Middle as mentioned above, it would seem plain that the Old French Burial-ground occurred about where King, Union and Middle Streets meet, and extended

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thence northward and eastward much as indicated by the dotted area on D. Thus it appears that it must originally have been of considerable size, and it no doubt occupied a low knoll well above the tide in the Acadian period. Moreover it is the only French burial ground anywhere around the harbour, with a possible exception mentioned below, of which any record or tradition whatever remains to us, another fact emphasizing its importance. Hence it was in all probability here that the prominent French officials who died at St John, including both La Tour and Governor Villebon, and perhaps earlier Madam La Tour also, were buried.

It is however barely possible that a French Burial-ground existed also at Portland Point, though the evidence is very scanty. A note in one of Moses Perley's lectures, along with his mention of the French Fort at Portland Point, speaks of skeletons there—(These Trans. 1891, ii, 68)

Again in the St. John Globe of Sept. 18, 1887, there is an account of the finding of nine swords and two axes in excavations made on the north side of Water Street in Carleton, just below Mr. Uriah Drake's house, and the suggestion is offered that this may be the site of "a part at least of Charles La Tour's fort." This location however was apparently occupied by a blockhouse in 1763, as shown by the important Map No. 36 later in this paper, thus affording an explanation for the presence of those relics.

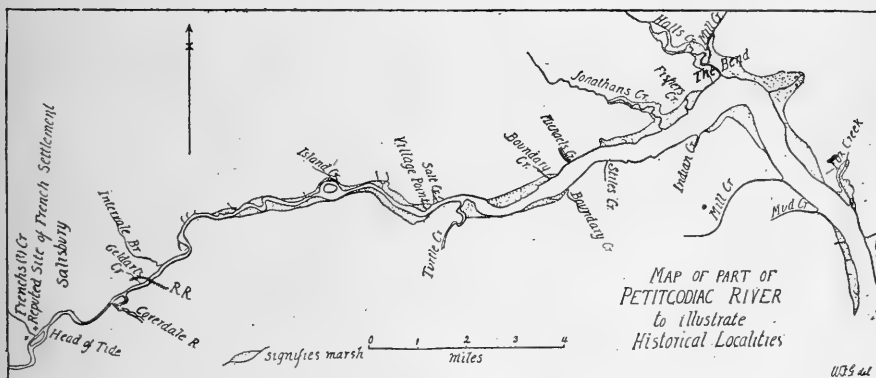
The former presence of the French at Musquash is confirmed by a statement by Chas. Morris in 1762, who says (Archives, 1904, 297),—"Musquash Cove and a River—here lived about a dozen French families who existed chiefly by a Trade with the Indians."

276. The traditional old fort at Harding's Point mentioned on this page is likely the same as an ancient work, which has recently been discovered by Dr. Silas Alward of St. John at Gregorys (Hardings) Point, a commanding bluff opposite the mouth of the Nerepis. Dr. Alward has been kind enough to send me a description of the work, which he is later to study more thoroughly. After speaking of the strategic position of this conspicuous bluff, which commands the Reach above and the River below, he says;—On the side of the hill a short distance from the shore "we came upon a finely constructed rampart of large rocks or boulders, in which was not to be found a single breach. It was in places four feet in height and about the same width on top. It evidently had been constructed with great care..... it is four hundred and fifty feet in length....it was moss covered..... it had apparently been scientifically constructed. How the large boulders had been carried up the steep side of the hill excited our surprise. Its site is now marked by a dense growth of trees..... I made enquiry of residents of Woodman's Point and they had never heard of it." It is possible that this represents some military work of the Acadian Period, perhaps an accessory to help Fort Boishébert to hold the river, or perhaps it was the battery erected in 1755 by Boishébert at the Narrows, as mentioned by Raymond in "The

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St. John River," 118, though as Mr. Raymond points out, this battery was more likely at *Nid d'Aigle* above the Belleisle (Historic Sites, 275).

It is possible that a French post was established on the St. John in 1749 at a location suggested in an article in the "Gentleman's Magazine," July 1750, 295. After mentioning the well-known expedition of Capt. Rous to the St. John in the Albany sloop of war (described in Murdoch's *Nova Scotia*, II, 153) it adds,— "on his return we found that the French had attempted nothing near the mouth of the river; but that they were about to secure themselves at some considerable distance from it, at a place the French Governor claimed as the southern boundary of Canada or New France. This being in a country inhabited by Indians, and the navigation of the rivers being unknown to most of the English, nothing further could then be done." The southern boundary of New France here mentioned is no doubt that explained in the *Boundaries Monograph* page 216; it was the line drawn through about 46° on the D'Anville map of 1746 which would cross the St. John near Fredericton. Hence the



MAP NO. 24. COMPILED BY THE AUTHOR.

post to be established would probably have been St. Anns, though it may have been much lower, perhaps at the *Nid d'Aigle* or *Etablissement François* at the Narrows above the Belleisle. (Compare page 275 of *Historic Sites Monograph*). It could not, however, have originated this post, since it is marked on Bellin's Map of 1744.

276C. Fort Nerepis... A reference in Casgrain's edition of the *Journal de Marquis de Montcalm* (337) seems to show that this fort was called *Sainte-Anne*. He speaks of it as a poor little fort burnt by Bois-hébert rather than to allow it to fall into the hands of the English.

282. By an old resident of Salisbury I have been told that the stream just above Salisbury is called *French's Creek*, (Map No. 24) and that it was settled around its mouth by the French. I have examined the site; it seems a very likely situation for such a settlement, but I could find no evidence for it.

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There was also a small French settlement in 1771 or earlier, a short distance up Coverdale Creek, as shown by the Calhoun diary published in the Chignecto Post, Dec. 7, 1876. He described a visit to an Indian settlement apparently at the head of tide, (which is at or near Salisbury), and then clearly describes going to Coverdale Creek "on the south side near the line of Hillsboro Township..... We travelled up this creek for a mile and a half after going to the east side of the creek we saw some of the French Pirate houses. I was informed the French took a large schooner once into this bay and ran her so far up this creek in the time of spring tides that she never was got out again." A sloop and schooner which the French had taken to "two different creeks near the head of the river," are mentioned by Moncton in his Report of 1758 (in the Collections N. B. Historical Soc., II, 172, 173) though these were brought out.

Another French settlement in 1771 mentioned by Calhoun as somewhere lower down the River, was very probably at *Village Point*, above Salt Creek.

A MS. history of Hillsborough, sent me by Mr. G. D. Steeves of that place, contains this statement about the French settlements there;—"Major Frye of the Garrison at Fort Cumberland was sent with a vessel and several hundred men to take the Acadians dwelling along the Petitcodiac River. The expedition came to anchor at Gray's Island. The French fled to the woods, and unable to capture them, Frye was forced to content himself with burning their houses and razing everything to the ground, including the chapel that stood very near the site of the present new Temperance Hall." This agrees fairly with the account in Murdoch's Nova Scotia, II, 295.

In the Calhoun Diary of 1771 Gray's Island is called *Delatongs Island*,—apparently its French name.

282. I. **Shepody.** Since the "Historic Sites" was published I have been able to visit and examine with some care the remains of French occupation at Shepody, in which work I have had the advantage of the aid of Hon. A. R. McClellan who knows that region so thoroughly. The various localities, as identified on the spot, are shown upon the accompanying Historical Map of Shepody (Map No. 25). The site of the French Church is pointed out by residents with great positiveness, and I have no doubt with perfect correctness; the local name of the brook beside it, Church Brook, is the best evidence, the more especially as no church has existed in this vicinity since the first permanent settlement. The church is said to have stood just to the east of Church Brook (which runs in a deep ravine or "vault"), and south of the road, on a site now occupied by a house belonging to Mr. John Moore, and the old cornerstone of the church is said to be built into the cellar wall. Just behind or to the south of it is the reputed site of the old French burial ground, and certain hollows are pointed out as the sunken graves, and other graves are said to have been found under the present highway. Farther south, a little east, on the margin of the upland near the marsh is a fine spring, locally called the "Holy Spring." The situation is a charming and commanding one, on the



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margin of the largest marsh in the region, near the natural landing place, and in the most likely situation for a first settlement. All the evidence is so completely in agreement that I have no question that the church stood here and this was the centre of the French settlement of Shepody.

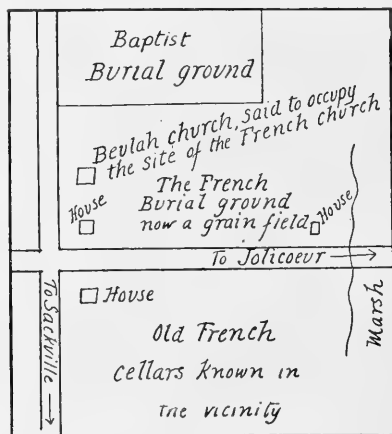
I have been told there was a French burial-place on Blueberry Island, the larger (and innermost) of the two small marsh islands between Riverside and Albert (the smaller is called Cranberry Island).

Perhaps next in interest among the relics of the Acadian period was the burial-mound in which were buried the remains of the British soldiers killed in 1755 by Boishébert. The local tradition is that the English landing to destroy the church, were ambushed by Boishébert with Acadians and Indians, who, concealed behind the dikes, killed 30 of the enemy and compelled them to retreat. The French afterwards buried the fallen soldiers on the marsh in a grave so large as to form a considerable mound. I think there is no doubt of the substantial correctness of the tradition, though it may not be exact in details. Thus there exists an account of this affair in a letter written by Boishébert himself to M. Drucourt, Governor of Cape Breton, under date Oct. 10, 1755 (see Report on Canadian Archives, 1887, page CCCLXXVIII), which reads in abstract;—"In spite of his efforts he was unable to prevent the enemy burning the houses at Chipody; but he pursued them on the following day and compelled them to take to their ships, with a loss of 45 men, left on the field, many drowned and 60 who reached the ship dangerously wounded." The approximate site of this mound is well known locally, and as shown on Map No. 25; but it no longer exists, since a few years past it was washed away by the sea which is gradually eating into this marsh. Some years ago, it is said, the mound was dug into by a Mr. Tupper (afterwards removed to the United States), and various articles such as buttons etc. were found, all in agreement with the reputed use of the mound. The situation is precisely adopted to the tradition, for the Five-fathom hole, off the north end of Grindstone Island, is the natural anchorage for vessels, so that the natural landing-place for an expedition against the church would be in the vicinity of the mound. Some further mention of this expedition, with the names of all the men killed, is given in the Willard Diary of 1755, of which a copy is preserved in the Town Library at Lancaster, Mass.

The sites of French mills are pointed out at several places. The most interesting is at Tingley Brook (next east of Church Brook), on which, some one-fourth to one-third of a mile north of the highway, there is a fine little fall of some 7 or 8 feet in a deep ravine. Some 20 yards below it there still lie in the brook-bed the two mill-stones, one of freestone (3 feet 2 inches in diameter and 5 inches thick, with the marks of the iron attachments) and the other, of which only one-half remains, of coarse granite. Traces of an ancient wooden trough which carried water from above the fall to the stones can still be seen. The arrangement was apparently a simple overshot wheel, and probably the tradition is correct that it was French, though of course it could possibly have belonged later. It is said that other

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ancient millstones exist on a branch of German Creek, and possibly still others on Beaver Creek at the head of the present millpond. Another French mill is said to have stood on the Horn Brook in Harvey, and the big ditch called "Cut Creek" is believed to have allowed boats to reach it, though the dam on this stream just above the present road is known to be of later origin. Dams on the tidal streams, said to have been made by the French for tide mills are reported in at least two places on the marsh creeks. Of course many French cellars are known in various localities and some early dikes are shown as French. It is also said that the bog beside the Shepody river above the present good marsh shows signs of former cultivation supposed to be French. Another interesting relic is that called the "French Fence," a structure built across a piece of open boggy swamp in the approximate positions shown on the map. The stumps of the slabs (pieces curved on one side and flat on the other) set edge to edge forming a very close fence, can still be



MAP NO. 26. FROM A SKETCH BY THE AUTHOR.

seen in several places. It is difficult to surmise its use, for the labour expended upon it seems much too great to be thus explained. While all these remains are reputed French, it must be remembered that a good deal of diking and other cultivation was accomplished by the temporary Germantown colony between 1765 and 1770, and some of these works may have originated with them.

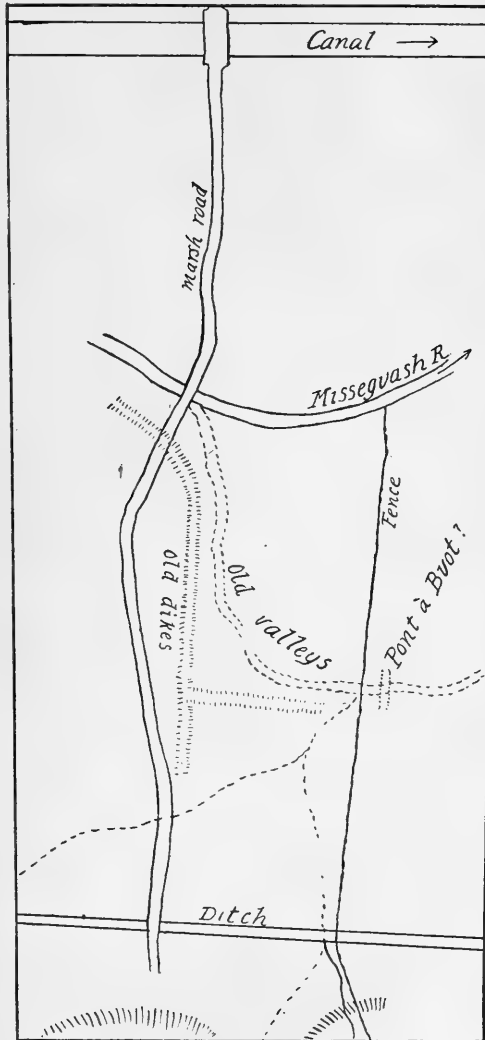
Some mention of the occupation of the marshes near Cape Enrage by the French occurs in the Calhoun diary of 1771 (published in the Chignecto Post, Dec. 7, 1876 and later). He speaks of a marsh some two miles west of Cape Enrage, which had been improved by the French. This must have been the marsh on the first river east of Cape Enrage. Still nearer to the Cape was "a thick strip of woods which made a good defence to a fine piece of marsh, through which a small river runs about N. E. Here some of the French buildings stand, and judging by their barns they raise great crops of grain."

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This marsh was of course the remarkable strip running inside the Cape Enrage ridge. Later, in speaking of Haha, he says;—"The Haha River runs from S. W. to N. E. through a fine piece of marsh which has been improved by the French, and dykes could now be very easily repaired. There are two of the French houses standing yet, and some apple trees."

280. *Prée des Richards* no doubt was the village at Morice's Brook at Upper Sackville, and was the *Richart* of Montessor's map. I find also that the site of the village of *Tintamarre* at Four Corners is very well known locally, and about as shown on the accompanying sketch map (Map No. 26). It is believed locally, and in all probability correctly, that the French church of Tintamarre, which was one of some importance, stood on the site now occupied by the Beulah Baptist church.

284 and 290. I have made attempts to identify upon the ground the exact site of Pont à Buot, with results shown on the accompanying sketch map (Map No. 27). There is only one stream, apparently, which can be the Ruisseau à l'Ours of Franquet's maps (Maps Nos. 26 and 27 of Historic Sites), and its identity is made the more certain by the fact that here as on Franquet's map, the Misseguash (St. Marguerite) comes the nearest to the upland on the north. An inspection of the ground shows very clearly why the French chose this place for their bridge across the Misseguash. It combines the advantages of being the bend which comes nearest to the upland on the French



MAP NO. 27. FROM A SKETCH BY THE AUTHOR.

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side of the river, hence making the bridge the more easily defensible by a post on the upland, and at the same time it is above the wide tidal part of the river, where it was narrow enough to be easily bridged. It was, however, no doubt much wider than it is at present, since the size of the present stream, which is little more than a ditch a few feet across, has been greatly affected by the digging of the "tide-feeder" ditch many years ago, as well as by the larger canal; furthermore, from natural causes the tidal part of the river is moving all the time towards its mouth. Comparing Franquet's map with modern conditions it seems very plain that the modern stream is much further from the bank there than in Franquet's time, due no doubt to the cutting across of the ox-bow at this place. But nevertheless the old courses of the streams can be traced, and about as shown on the map. This would bring the Pont à Buot about as marked though there is not the slightest trace of it in existence. Neither can the site of the post on the upland near by be identified, though the nature of the ground shows its approximate position.

290. **Memramcook.** A memoir of 1750 by Léry mentions "A l'embouchure de la riviere de Memeramkouk," certain buildings,—a bakery (boulangerie) 10 feet square, a hospital (hôpital) of 18 and a house of 12 (feet square), all of round stakes and covered with bark. It is possible that this was the post at Fort Folly, (page 290 of *Historic Sites*), though it may have been on the site of Dorchester.

The existence of a post at Meringuin in 1749 is shown by a Memoir of Father Germain of that year. He speaks of a great cape opposite Shepody where "l'on faisait le garde dans le temps du détachement à Beaubassin."

291. **The Indian Fort** is mentioned by Gesner (*New Brunswick*, 141) who states that it is the remains of a fortification thrown up by the French immediately after the capture of Quebec. The local tradition, as told me by Judge Hanington, is that the works were "thrown up by the crew of a French frigate which wintered there in 1760. This vessel was bound to Quebec, but on learning of its surrender to the British in the fall of 1759, the Captain ran into Shediac and remained until the spring of the next year."

Some important information about Shediac in 1749 is contained in a Memoir of that year by M. Léry, for a copy of which I am indebted to M. Gaudet. After describing the port, in which vessels could not go farther than the Little island [Indian Island], he says that in 1749 there was built at the port of Shediac a store-house of 20 by 36 feet, a house of 20 by 24, two other houses of 20 by 30, and another building of 10 feet square. Unfortunately he gives no idea of the location of these buildings, though he adds, that at the head of tide two leagues up the river, where a road to Petitcodiac started, there was a house of 9 feet square, a storehouse of 30 feet by 24 of round stakes and covered with bark. He makes no mention of the fort established in that year by La Corne, and it is very likely the fort was nothing more than the former buildings palisaded. Early maps

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mark the fort on the North side of the Shediac River near its mouth, but nothing is known locally of such a site.

From the head of the tide on the Shediac River through to Petitcodiac there was a "chemin," or road, five leagues long, which he describes as extremely bad. This was no doubt cut by the French for a horse and waggon road, in order to keep open a communication between Quebec and the posts on the Petitcodiac. A Memoir of 1749 by Father Germain, however, speaks of this road as very good.

The site of the first modern French settlement at Shediac is shown, as near the present Shediac Cape, on DesBarres map of 1781 (Map No. 28a, B), and this site is confirmed by tradition.



MAP NO. 28. FROM AN OLD MS. MAP; $\times \frac{1}{2}$.

291. **Cocagne.** The site of *Belair*, still locally known, was, as I have been told by a resident, about a mile above the present bridge on the north side. It was no doubt at the place marked upon the accompanying map (Map No. 28 from one in the Crown Land Office, apparently a tracing from DesBarres Chart of 1781) "Cleared Land and Orchards;" while the sites of several houses are also shown.

On this same map two other settlements are marked. One, (on the portion in the upper left hand corner, of the map) was just north of the present Dixon Point. The other was in the present Robin Creek, and marked with the name, *Mons. d'Yberville*, of which I know nothing further.

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Another interesting Cocagne locality was the *Ruisseau des Malcontentes*, where, according to Gaudet (letter), there was a temporary Acadian settlement after the expulsion. This is shown on old maps; it is the stream some two miles south of Dixons Point.

A memoir of Father Germain, in 1749 has this mention of Cocagne:—"Cocagne....où havraient les bâtiments, goelettes envoyés a l'Acadie du temps des détachments."

The site of the first modern French settlement at Cocagne is very plainly shown upon Des Barres map of 1781 (Map No. 28a, C).



MAP No. 28a. FROM DES BARRES CHARTS OF 1780-81, $\times \frac{1}{2}$. A, NEGUAC; B, SHEDIAC; C, COCAGNE; D, RICHIBUCTO; E, BUCTOUCHE.

291. **Buctouche.** On the point between Black River and Buctouche River, as I have been told by the late Rev. Father Michaud, who knew the local history of Buctouche well, the ancestors of the modern settlers on their arrival in 1785 found traces of older settlement. These were remains of camps or houses supposed to have been made by earlier settlers "taken and exiled by the English," the houses being said, traditionally, to have been burned. No doubt these were the homes of the Acadians who are known to have been settled at Buctouche in 1760. That this was indeed the site of the earliest settlement, as tradition asserts, is confirmed by DesBarres chart of Richibucto-

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Buctouche of 1781 (Map No. 28a, E), which places here three houses, with none elsewhere about the harbour. Mr. O'Leary tells me, from his knowledge of the locality.—“They seem to have occupied a small tract of level ground towards which the land falls sharply just south of the present road from the village. They were undoubtedly between the graveyard which occupies a fairly high bluff and the Chapel Point shoals at the land end of which is a small tract of swamp.” Father Michaud also described the old burial ground on Black River (see earlier, under Indian Period) as French, though Mr. O'Leary thinks it Indian.

291. **Richibucto.** Additional information as to localities of the Acadian period upon Richibucto is as follows. I am told by Mr. H. A. Powell of Sackville that a French vessel with cannon on board is said by tradition to be sunk somewhere about the mouth of the Aldouane, from which it is possible that river takes its name. Again, just within the mouth of the Aldouane on the north side is an old burial ground, locally said to be either Indian or French. It is no doubt this which is mentioned by Cooney, 134, and as an Acadian village was said to have stood near, the burial-ground also would seem to have been French. Further, in documents of the year 1760, loaned me by M. Gaudet, I find it stated that in that year 11 Acadian families, 68 individuals, formerly resident at Bay du Vin removed to Richibucto. It is altogether likely their settlement was on the present site of Richibucto, for Cooney, 134, states, “It is said, however, that before these events occurred, there was a French village, containing upwards of forty houses, situated a short distance above or in the immediate vicinity of the present Court House of Liverpool” [Richibucto]. An early French settlement is also reported on Indian Island (earlier also called French Island), but this probably refers to the ancestors of the settlers of the present Richibucto Village, who came here in 1790.

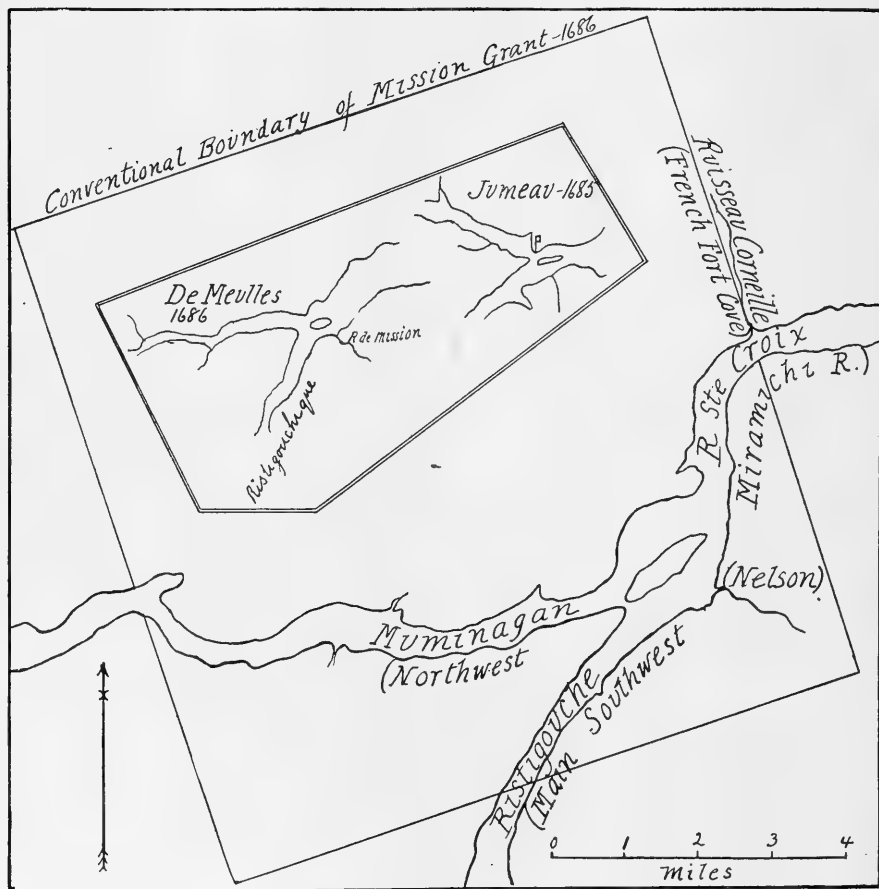
The sites of the two principal Acadian settlements are shown upon DesBarres Map of 1781 (Map No. 28a, D).

292. In the Settlements Monograph, 37, 127, I have mentioned, on the authority of a resident, a supposed Acadian settlement above Doaktown. On further inquiry I find that the cellars etc. mentioned by him are identical with the hollows at the mouth of Clearwater, described in Historic Sites, 231. Others like them are said to occur also at the mouth of Rocky Brook. I think the tradition that these are French is probably in error and that they are of Indian origin.

- 292A. **Settlement of Richard Denys de Fronsac.** The importance of this settlement, by far the most extensive on the Miramichi in early times, has led me to give much effort towards the determination of its site. And although I have not been able to settle the matter definitely, I have obtained some new data as follows. Most important of all is a document entitled “Vente de L'habitation du Sr. de fronsac Riuiere Ste Croix à Mrs. du Seminaire de Quebec,” preserved among the

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papers of François Grenaple in the Judicial Archives at Quebec, and for a copy of which I am greatly indebted to the Keeper of the Archives M. Philéas Gagnon. This important document, which I intend later to publish in full with translation (probably in my series of Historical-geographical Documents in the Collections of the N. B. Historical Society), recites that the Sieur de Fronsac having offered the authorities of the Seminary of Quebec three leagues of land at the River St Croix (Miramichi) for a mission, that he (de Fronsac)



MAP NO. 29. EXPLAINED IN THE TEXT.

wishing to leave his establishment at River St. Croix for another place more convenient for his business, and that the said place being found very convenient for the purposes of the mission, as shown by the report of the missionary Thury, he [Fronsac] hereby sells to the authorities of the Seminary all his improvements (including buildings, clearings etc.) at the said place and also grants them there the three leagues of land of which the boundaries are described. Happily these

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boundaries, in general features at least, are beyond dispute (compare the accompanying map, Map No. 29, and the original wording later under Seigniories). Beginning at *Ruisseau corneille* (in English Crow Brook), which the context seems to show can be only the present French Fort Cove, where a north and south line is established (apparently magnetic and not true north, as shown on the map), to run three leagues up the river called *muminagan* [the Micmac name of the Northwest Miramichi] which empties into the river St. Croix [viz. the Miramichi below the Forks], and equally along the south shore of the river, to a distance back of a league and a half on both coasts, limited by east and west lines, to include the tongue of land between the *muminagan* and the *ristigouche* [a variant of Micmac name of the Main Southwest Miramichi].

Thus the establishment of Denys de Fronsac prior to 1686 must have been in the near vicinity of the Forks of the Miramichi at Beaubears Island, and it must have been here, and not at Burnt Church that Father LeClerc found the fort in 1677 (Hay's Canadian History Readings, 271). But exactly where was it? Now the Jumeau map of 1685 (given reduced in Map No. 29) places a flag on the point just on the north side of the entrance to the Northwest. On the other hand the Franquelin-de Meulles map of the next year (Map No. 29) marks the small stream on the south side of the river in Nelson as *R. de Mission*. If the mission was established on the very site of Denys' settlement as would be likely because of the buildings and considerable amount of cleared land mentioned in the Document, then his settlement was beside this brook on the present site of Nelson. But it is at the same time possible that it stood on the north side, where Jumeau places the flag, the presence of which is otherwise difficult to explain. At all events in one place or the other stood this long-sought establishment of Richard Denys de Fronsac.

But the matter does not end here. In the above-cited document, Richard Denys states that he is to remove elsewhere for the convenience of his business. That he did not remove from the Miramichi is shown by two facts. First, he received a large seigniority on the north side of the river and bay in 1687, and second a Memorial dated 1689 is extant in which he states that he is building a fort of four bastions, that he had built for himself a house of freestone, that he has 24 men employed at Miramichi, and that he has settled near his habitation there an Indian village of 80 cabins and 500 souls. Where now was this second establishment? In his work of 1688 St. Valier speaks of it as being at a very pleasing place called Miramichi, on the river of Manne at a league from that of St. Croix, and that near it is a place called in the native language Skinoubondiche. Now Skinoubondiche can hardly be other than the *Eskinowobuditch*, the Indian name for Burnt Church. Hence it is very likely the River of Manne was Burnt Church river, which is not much over a league from the mouth of the St. Croix in Miramichi Bay. The presence of the Indian village mentioned by Fronsac would also confirm this since Burnt Church has been from very early times an important Indian settlement. Against this view I know only one fact. St. Valier (p. 32 of

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Quebec Ed. of 1856) in describing the place says;—"Miramichy est an lieu fort agreable sur la riviere de Manne, a une lieue de celle de Sainte Croix; il y a un petit fort de quatre bastions formez de pieux, et dans ce fort une maison où Mr. de Fronsac fait sa demeure. Prés de là est un lieu qu'on appelle en langage du païs Skinoubondiche, et nous avons pris aux environs les trois lieues que Mr. Denis nous a données pur nôtre Mission." It would appear from this passage that Skinoubondiche and the Mission grant, and hence Fronsac's establishment were all near together. Yet the locations of the two former seem perfectly plain, and the expression "aux environs" was natural enough when the places were so near together in comparison with the vast stretches of wilderness which separate them from all other inhabited places. Burnt Church has been from early times a very important Indian settlement. The probabilities therefore seem to me to point strongly to the vicinity of Burnt Church. To try to determine its exact position by tradition or remains, or in default of that to examine the ground for hints of a physiographic sort, I visited the region in September, 1904. Extended inquiries of English, French and Indians in the region yielded no tradition of such establishment, nor could I find any traces or knowledge of the existence of any stone building (Denys' house of freestone) in the vicinity, excepting that the church burnt by the British in 1758 is said to have been of stone. The nature of the country, however, did make one fact plain, that for a long distance up and down this coast, there is no site to compare with the region about the mouth of Burnt Church River as a site for a combined trading, fishing and farming center, natural advantages proven by the fact that to this day the principal settlement and fishing center, as well as the greatest Indian settlement of all this region are situated here. The ground is more elevated and of better quality than for a long distance up and down the coast. The Burnt Church River is very rich in fish and game, making it a favorite center of the Indians, while the Salmon and other fisheries of Miramichi Bay and Portage Island (including the traditional sea cow fisheries of Portage Island) are more accessible from here than from any other point. Further it was the site from early times of the most considerable Indian settlement in this region, and also was situated at one of the great junctions of Indian travel,—where the route along the coast and that up the Miramichi came together,—making it the natural trading center of this section. Every consideration derived from natural features would therefore locate it in this vicinity, and this locality is perfectly consistent also with every piece of historical evidence we possess. If in this vicinity, then where exactly? St. Valier tells us it was on the River Manne (presumably Burnt Church River), and near Skinoubondiche. Since Skinoubondiche was Burnt Church Point where the Indian village now is, this would seem to locate Deny's settlement on the north side of that river. Hence I examined this locality with special interest (Map No. 30). It is now an open common belonging to the Indian reserve; it is as elevated, and as pleasing and extensive in its view, as Burnt Church point itself; it appears to have excellent soil, and is provided with

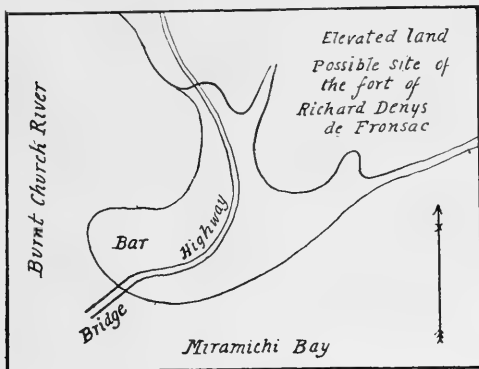
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good landings on fine beaches, both from the bay and from the river. Various traces of former buildings show on the ground, though of course they may be much more modern than those we are seeking. Altogether the situation appears ideal for such a settlement as that of Denys, and I believe the probabilities based upon all available evidence all point to this site.

It is of interest to note that another document of 1691 speaks of de Fronsac as being then a resident of his seigniory of Miramichi.

It was here that Smethurst found French settlers in 1761 (Narrative, 13; Coll. N.B. Hist. Soc. II, 377), and others at Neguac (pp. 16 and 375). Various French relics have also been found and French cellars formerly occurred on the Logie farm at the English Village of Church Point east of the wharf, as I am informed by Miss Kate Logie of that place.

294. **Bay du Vin.** All local tradition, substantiated by still visible cellars, a burial-ground and sundry relics, goes to show that a French village of considerable importance stood in the Acadian Period around, the



MAP NO. 30. SKETCH BY THE AUTHOR.

present Gardiners Point south of the island. This is no doubt the French Village mentioned by Cooney (31, 32, 33), though he undoubtedly errs in ascribing to it so early a date as he does. The *Baie des Ouines* Village is mentioned in documents as the principal Acadian settlement at Miramichi in 1760. I have not myself been able to visit this site as yet, but Rev. W. J. Wilkinson of Bay du Vin has been so kind as to send me the following information about it. The settlement was about a mile in length: the old cellars can still be seen, including the foundation of an ancient blacksmith shop, and numerous relics have been found there. The site of the old church or chapel, supposed to have been the oldest on the Miramichi, is locally well-known; it is vacant and marked by a hollow and a heap of stones. Not far from it is the ancient French burial-ground, showing the graves. The French settlements at Lower Bay du Vin are well-known to be of later origin as shown in the "Origin of Settlements"

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Monograph. But there was also an old French Settlement, marked now by many cellars, etc., just west of John O Bears, or French River Point, probably cotemporaneous with if not simply an extension of that at Gardiners Point. Mr. Wilkinson tells me that a French settlement also existed on Bay du Vin Island, various traces of it having been found. On this island also is another locality of some interest, the old well examined by Bishop Howley on his visit in search of evidence as to the location of Vinland (These Transactions, IV, 1898, II, 97). A French relic of yet another sort occurs in the remains of the reputed French man of war sunk at the mouth of Bay du Vin River just below the present bridge. Mr. Wilkinson writes me the local tradition is that she was sunk there by the French themselves in order that she might not fall into the hands of the English. "Divers have been down to her more than once in the hope of finding treasure. The last time was about twenty years ago." This may be the vessel *L'Indienne* of Morlaix mentioned by Cooney (34) "whose remains are still lying a short distance from the mouth of Baie des Vents river." But it is also possible that the local tradition is in substance correct, and that she or her captain, gave name to Bay du Vin. (Compare under this name in Place-nomenclature, earlier).

295. **Miramichi.** In 1760, according to a careful enumeration by Sieur de Bezagier, (in documents mentioned under St. Simon below), there were 46 families (262 souls) at Miramichi, in three postes, of which one was at *Baie des Ouines*. Another no doubt included the families in the vicinity of Burnt Church, some of which were mentioned by Smethurst the next year, while the third which included a few French soldiers, was probably at French Cove or at Beaubears Island. But later in the same year he makes 35 families of 194 persons at Miramichi and 11 families of 68 persons at Richibouctou.

The positions of the settlements of the founders of Neguac and Rivière du Cache are indicated upon DesBarres Chart of 1781 (Map No. 28a, A).

296. There was possibly a small French settlement, antedating all the modern settlements, on Big Tracadie River just above the mouth of Nicholas River. Dr. A. C. Smith of Tracadie has written me that "Fireplace cranes and a few other household articles were found years ago immediately above Nicholas Creek, on South side Big Tracadie River where Nicholas Richard now resides," while at Fourniers Point a box containing writings was said to have been dug up about forty years ago. At the latter locality also was found a very ancient gun, now in the Crown Land Office at Fredericton.

- 296A. **Money Island** (or *Isle au Trésor*). This little Island, in the eastern part of Miscou Harbor has a great local reputation as a place of mystery and buried treasure. This distinction it owes in part to its striking appearance, for it is of glacial upland elevated some six or more feet above high tide in a region otherwise very low, and partly to the fact that many relics have been found there, including gun-flints and crockery, silver coins, (which I have seen), an old pistol

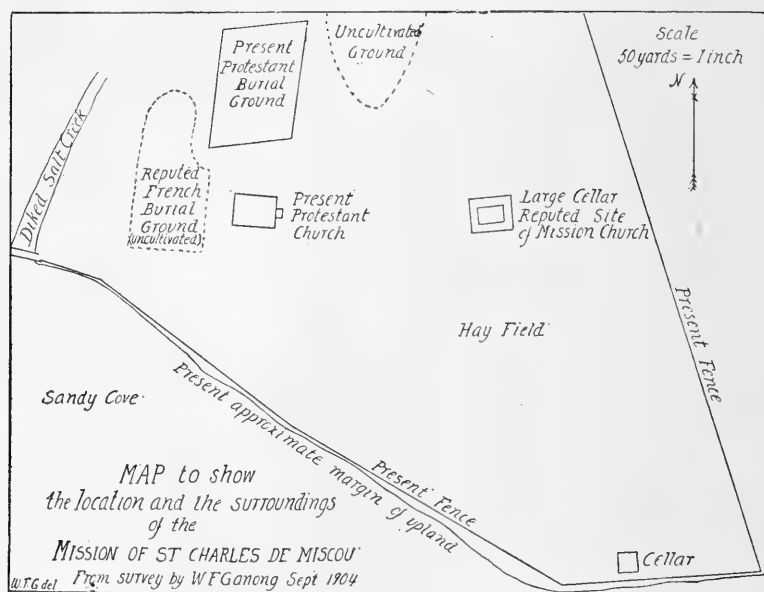
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handle, (now in my possession), and the striking religious medal, now in possession of Rev. Father Doucet of Lamec, described by S. W. Kain in *Acadiensis*, III, 96. Its surface is mostly wooded, but is bare at the southeast end where are some excavations seemingly old cellars, but largely if not wholly the work of money diggers who have left scarcely any part of the island's surface undisturbed. The relics may possibly be entirely result of Indian occupation (see earlier, Indian Period), but their character seems to show that some European settlement formerly existed there, and I think it altogether probable that it was the site of the wintering establishment of La Ralde in 1626-27. Thus Biggar, in his "Early Trading Companies of New France," page 128, in speaking of La Ralde's operations at Miscou says;—"Several men were left for the winter at Miscou to barter some goods which he had not been able to exchange during the summer. Although attacked by the scurvy, these managed to survive and doubtless presented La Ralde with a good supply of furs on his return in the spring of 1627." Again (page 139) speaking of the destruction of the fishing huts and other buildings by Kirke in 1628, Biggar cites a MS. in the Bibliothèque nationale to the effect that one of these buildings constructed by La Ralde was "un batiment contenant plusieurs demeures de planches doubles, dehors et dedans, fortifié de palissades tout autour." We have no direct evidence whatever as to the site of this winter settlement, but considering that the only other early known sites about Miscou Harbour are otherwise amply accounted for (viz., the Mission of St. Charles and the fortified habitation of Denys, considered below), and remembering the partiality of the early French for forming their winter-settlements upon islands (witness that on St. Croix Island and Emenic on the St. John) as places more readily defensible, and perhaps also as more compact and home-like than the boundless wilderness of the mainland, it seems at least probable that La Ralde's winter settlement was on this island.

- 296B. Mission of St. Charles de Miscou.** My account of this site in the *Historic Sites* was given before I had visited this region, and it is erroneous. As a result of two recent visits, however, I have obtained very satisfactory data upon the subject. I found that near the southern extremity of the island, at the entrance to Miscou Harbour, (Map No. 31) there is locally known the site of a considerable early French settlement with an early reputed church site, and an old French burial ground. The various features of importance are shown upon the accompanying map (Map No. 31). The general situation is a very fine and advantageous one, close beside the principal settlement of Miscou Island. The ground here is elevated and commands a fine view not only of the Harbour but out over Bay Chaleur as well, at the same time making a church here very conspicuous from a great distance. It is close beside the anchorage for fishing vessels which run into the harbour and take shelter behind the long sandy point extending into the harbour, while a cove inside the point, with its fine gravelly beach, forms an ideal landing-place at or near high

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water for boats or canoes. No place in all this region could on general principles be better situated for a Mission intended for the use of both Indians and French fishermen. There is at present a little Protestant (Presbyterian) church in the midst of the site, and beside it a modern burial ground, (see the map). Behind the church is the reputed old French burial ground, which, while cleared of the larger trees, has never been ploughed. The owner of this and the neighbouring property, Mr. John Marks, tells me it was known to his father as a burial ground and hence it was left unploughed when the land was first cleared. It is said however that fragments of old coffins have been found within the limits of the present burial ground, and a stone inscribed with a cross is said to have been dug up here in recent years. Some distance to the eastward of it on the open field



MAP No. 31.

is a large cellar, very much larger than that of any French house I have seen, larger than the foundation of the present church near by and this is the reputed site of the church. This I think is probably correct, for the situation, on the highest ground in this vicinity is the very kind chosen for a church; the cellar is much larger than is ever found with the old French houses, and the station is very much too far from the water for that of a business establishment. Further, its east and west position is wholly in harmony with the usual orientation of Roman Catholic churches.

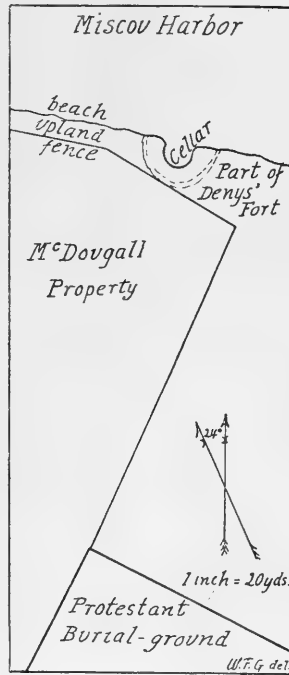
Scattered about in the vicinity of this site, and over towards the present settlement, are various French cellars, of which Mr. Marks tells me he knows at least fourteen, from some of which typical

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French relics have been dug, and all of which were here when Mr. Marks' father first cleared this land.

Taking all the evidence together, the positive facts, the traditions, the probabilities, the lack of a competing site, I think it is probable almost to certainty that here stood the Mission of St. Charles de Miscou.

- 298C. Denys' Settlement on Miscou Harbour.** The account of this site given in my *Historic Sites*, based entirely upon hearsay, is imperfect and in some degree erroneous, though its approximate location is correctly given. In September, 1904, I was able to visit the locality and study it in person, with the following satisfactory results. The site is well-known locally and is not yet entirely, though it is nearly, washed away. It is situated on the south side of Miscou Harbour as shown on the accompanying map (Map No. 32). The line of upland is sharply marked from the beach, by a sloping bank some two or three feet high. A large cellar (about 12 feet across) is about half on the beach and half in the bank, and around it is a low embankment, a foot or two above the general level but of an outline too indefinite to map exactly. This is all that can be seen at present. A large number of relics have been found on the site within the memory of residents, including not only the pitcher or flagon mentioned on page 299, but lead pipe, copper kettles and other objects. It is locally called the ruins of a "fort," and it is not known to whom it belonged, though it is believed to be the remains of an establishment of considerable importance. It is said also to be merely a fragment of its former extent; and, so rapidly is this coast sinking and being washed away by the sea, it will be only a few years before every trace of it will have disappeared entirely. That these remains are a part of Denys' establishment I believe there is no question. We know from Denys' own narrative that his establishment was on the south side of the harbour, and this is by far the best situation on all the coast,—in fact almost the only really eligible situation on the south side. The ground here is more elevated than it is for a long distance east or west, and the soil is also better, a point of some consequence, for Denys speaks especially of his gardens. The outlook is wide and fine. Further, it has the best landing beach and is the nearest to the deeper water of the harbour of any locality on this shore, as evinced by the fact that the landing of the Miscou ferry is just in front of it. No



MAP 32. SURVEY BY THE
AUTHOR.

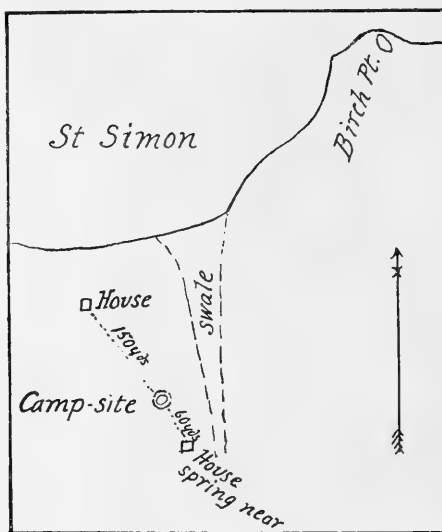
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situation east of it on this shore would be practicable for an early settlement because of the immense shoals which render landing extremely difficult, nor is there any equally good situation to the westward. All considerations appear to unite to locate Denys establishment here. The ruin may represent the corner of a fortified "habitation," while his gardens and the other parts of his establishment no doubt occupied the open fields behind and near it.

299. **St. Simon.** The attractive Inlet of St. Simon is the seat of an event about which cluster confused local traditions, the historical basis of which has been hitherto obscure. Happily I have been able to clear up the subject in great part, if not entirely. The local tradition in brief is this. St. Simon was named for a French war-ship run in here and sunk to escape the pursuing English at the time of the naval events in Bay Chaleur (viz. in 1760); her crew wintered on the shores of St. Simon, and afterwards settled at Lower Caraquet and became the ancestors of the principal settlers of that place. This is in part confirmed by Cooney (180) who says the place (which he spells St. Simoi), "is said to have derived its name from that of a French Corvette, sunk there after the conquest of Canada," and again (287), he speaks of Byron's fleet taking in 1760 a French ship in Gaspé Bay and another in Saint Simon, the latter statement, however, being erroneous, as will be shown below. Locally it is agreed that the vessel was sunk some 300 yards off Birch Point in about the position shown upon the historical map (Map No. 33), and it is also said that some of her timbers can still be seen projecting from the mud at very low tides. The place where her sailors wintered is also well-known locally, and I have visited and examined the place and have seen some of the relics found there. Just west of Birch Point is a cove into the head of which slopes an open swale, once no doubt the valley of a little brook. On the west bank of the swale, a little distance from the shore, (Map No. 34), in a line between two newly built houses, is the camp site. It is a flat place now in a field, and here have been dug up from time to time for many years past various relics of a military sort, bayonets, bullets, knives, cooking utensils, etc. The ground was cleared for the first time about 1902, when additional relics, now preserved by the residents near by, were found. There can be no question that this place was once occupied by Europeans, and, since there are no cellars, such as would mark an ordinary Acadian settlement, it is extremely probable the local explanation is correct. Further, there is a certain documentary confirmation of the tradition. On Ferguson's map of St. Simon of 1820 (the basis of Map No. 33) occurs this inscription:—"Anno 1760 here Capt. St. Simon a french Officer wintered with a small party from this event these two inlets are named after that gentleman." This plan, it is true, applies the inscription on the point just east of Rivière Brideau, and as a consequence that point is called on some early plans *Captain St. Simon's Point*. But in view of the universal local tradition and of many relics found on the site above described, I think there is no question the local tradition is correct as to the precise site. There is, however, another

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locality at St. Simon locally believed to be connected in some way with the sunken vessel, and that is the *Ruisseau la Chaloupe* opposite L'Islet (Map No. 33) which is so named, the residents say, because the sailors of the vessel went up the stream in their long boat (whence the name) and wintered there, at a site pointed out near the road, though no relics have been found there. There is much confusion locally, and especially among residents at Tracadie, Shippegan and Caraquet, as to the relations of *Ruisseau la Chaloupe* and the winter-camp, some believing that the wintering site was beside this brook, and others saying that the little swale west of Birch Point is called *Ruisseau la Chaloupe*. It was only after visiting both places and interviewing the residents that I was able to clear up this confusion. It is however unlikely that the crew of the vessel wintered in two different places and I think it probable the tradition as to *Ruisseau la Chaloupe*



MAP No. 34. SKETCH BY THE AUTHOR.

has arisen to explain the name, which originated in some other circumstance.

We turn now to the historical evidence, of which one item has been given in the Ferguson inscription above stated. Another of much more importance I owe to M. Gaudet, our leading Acadian historian, who has kindly loaned me his copies of the several letters concerning events at Bay Chaleur in 1760 described in the Canadian Archives, 1887, CCXXII-CCXXIII. In a letter dated Ristigouche, 17 Sept. 1760 written by M. Bazagier, acting Commissary to the French Minister, we learn that privateers were sent out against the vessels of the English, and among them one was described:—"Des particuliers de cette rivière [Restigouche], ont bien armé et fait sortir pour la course, mais depuis le 23 août, qu'ils ont mis à la voile, ils n'ont pas reparu. Ils ont une goélette de 35 tonneaux, armée de 47.

hommes, 10 pierres et 3 canons." This passage by itself would have little meaning were it not explained by another, in a statement of events at Restigouche, written Dec. 4, 1760 by Bazagier, which reads;— "Les Acadiens armèrent aussi une goëlette, 47 hommes formaient son équipage. Au commencement d'octobre ils firent à la vue de Gaspé une bonne prise. Ils furent poursuivis par une frégate qui leur fit échouer leur bâtiment. Ils se battirent vigoureusement à terre, et menèrent le tout à Chipagan où ils étaient encore à la capitulation" [of Montreal on Sept. 8, 1760]. These passages seem to settle beyond question the identity of the vessel sunk at St. Simon,— she was not a French war vessel, but a privateer schooner manned by Acadians from Restigouche (where over 1000 Acadians were then in refuge), and it shows that she was run ashore in October, by her own crew to escape a pursuing English frigate. Hence she was not one of the vessels pursued by Byron's fleet in July of that year, as Cooney thought. The fact that she was manned by Acadians explains another fact which has puzzled me much, namely that although there seems to be an agreement that her sailors later settled at Lower Caraquet, practically no names other than those of typical Canadian and Acadian families occur at that settlement.

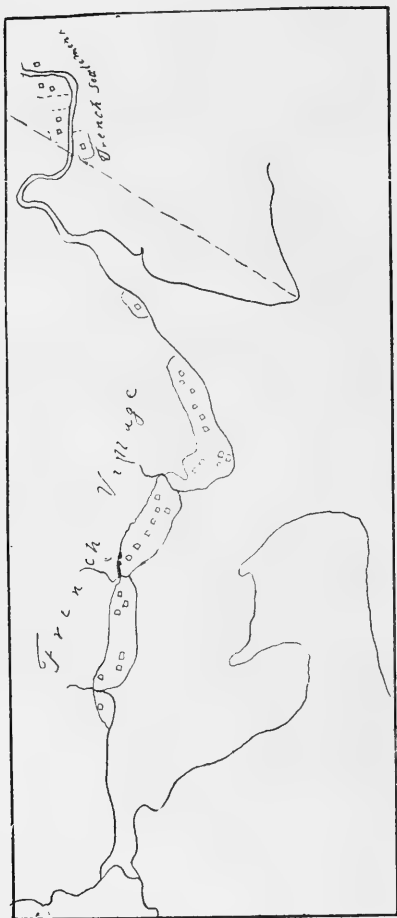
But one point remains to be noticed, whether the name St. Simon applied to the vessel, as Cooney and the general local tradition says, or to her captain, as Ferguson's note of 1820 affirms. Unfortunately M. Bazagier mentions neither her name nor that of her captain, although he gives both for the other privateers he mentions. In another paper of the same series, however, (a letter by Sieur Bourdon to the Minister, dated Ristigouche Oct. 11, 1760) it is said that Bourdon was to be commandant at Restigouche, along with the sieurs Niverville and Saint Simon. He then states that Niverville has a special post (which another paper shows to have been at Miramichi), but no mention is made of the duties of Saint Simon. Another note seems to show that he was at Restigouche Aug. 17, 1760 but he is not mentioned in a list of officers at Restigouche on Oct. 1st of that year. It seems therefore altogether probable that he was placed in command of the privateer manned by Acadians, and that he was the Captain St. Simon who wintered with the men of that privateer at St. Simon, and for whom the place was named. I have been told by Mr. Andrew Wilson of Miscou, an aged resident well versed in all the traditions of this part of New Brunswick, that he had heard from the older residents that this captain in the spring (1761) made his way with a few men by land to Halifax while most of the crew settled at Lower Caraquet. It was no doubt some of these, with their descendants who afterwards expanded from Caraquet to St. Simon, and whose descendants now form the population of that place.

299. **Shippegan.** In 1760, as shown by a statement of Bazagier mentioned above, there were five French families of 26 persons at Chipagan, and Smethurst in his narrative of 1761 states that Captain McKenzie has removed some inhabitants there leaving about six families, in one of whose huts he lodged. There is nothing positive to show just where this settlement was, but the context of Smethurst's narrative would

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seem to place it at the mouth of Ruisseau la Chaloupe (Map No. 33) on the north side of the mouth of which old French cellars are known (Compare Coll. N. B. Hist. Soc. II, 370). But it may possibly have been near Pointe Brulé, where it is said a very early Acadian settlement was, the residents of which later moved to Shippegan

Island and became the founders of its permanent settlement. Mr. J. E. Lantaigne of Caraquet, well versed in local history, tells me he thinks this Settlement was near Birch Point, where old cellars are known. Just west of Point Marcelle is said to be a place where the ground has been marked over into squares, of unknown age and meaning.



MAP NO. 35. WESTERN SIDE OF NEPISIGUIT HARBOUR, FROM AN OLD PLAN; $\times \frac{1}{2}$.

or early in 1761 Nepisiguit received a large accession of Acadian residents, either from Caraquet (see the preceding) or perhaps from Restigouche after the French had abandoned that post late in 1760. The earliest settlers appear to have settled on the western side of the harbour, where they still occur in the greatest numbers. In this connection an early plan in the Crown Land Office, showing the distribution of their settlement, is of interest (Map No. 35).

299. Caraquet. A document by Sieur Bazagier, in the series mentioned above under St. Simon, states that in 1760 there were at Caraquet 36 families (150 persons), in 3 villages. This would imply small villages at Upper Caraquet (at Little River) at Middle Caraquet (Chenards Brook) and at Lower Caraquet. It is, however, curious that Smethurst in his narrative of 1761 does not mention any Acadian villages at Caraquet, aside from his implication that "old St. Jean" and his son lived there. Since Bazagier mentions no French at Nepisiguit in his careful enumeration of the French settlements here, and since Smethurst shows that the next year there were many French at Nepisiguit, it is possible that the French removed from Caraquet to Nepisiguit in large numbers late in 1760 or early in 1761, very likely in order to be in a more retired position.

293. Missions at Nepisiguit. An interesting new reference occurs in Archives, 1904, 338.

300. Nepisiguit. The careful enumeration of the French settlements of this region in 1760 by Bazagier (see under St. Simon), gives no residents at Nepisiguit. Yet Smethurst found a large number in 1761 (see Coll. N. B. Hist. Soc. II, 365). Hence it would seem that late in 1760

- 300F. **Nicolas Denys' Habitation at Nepisiguit.** This establishment was in existence in 1679 and apparently also in 1689 for in a Memorial of the later date by Richard Denys de Fronsac it is stated,— "Ten years ago there was no other house than the one at Nepisiguit, with 17 or 18 hired men and as many French settlers of every age and both sexes, with munitions of war and arms in proportion." And later he speaks of eight Frenchmen then (1689) in his employ at his Habitation in Bay Chaleur, meaning, of course, Nepisiguit.
- 300G. **Enault's Settlement.** Additional evidence on this subject is given later under page 319 of these addenda. The document there mentioned speaks of Enault as a resident of Nepisiguit in 1691.
301. Very full information about Restigouche in 1760 is contained in the Documents mentioned earlier under St. Simon.
302. A very interesting subject still unworked is the assignment of the Baronies of Nova Scotia in the present New Brunswick. On these compare page 173 of Monograph on Boundaries.
307. References to the French Seigniories occur in the Report on Canadian Archives, 1899, Supplementary Volume, especially at pages 285, 321, 289, 326, 345, 368, 385, 389.
307. **Sieur St. Aubin of Passamaquoddy** was not the Gourdan of Church's attack, as shown by documents in the Archives, 1899, Suppl. 408, 421.
309. As to the location of the territory of which **Sieur de Martignon** was governor, Dr. Hannay has shown me that it was not de Martignon, but his father-in-law, i.e., La Tour, who was governor of the 50 leagues of country, and that hence the reference is to the grant of 1656; hence Mines was no doubt Minas, while Maquo would be some place on the Maine Coast, probably near St. Georges.
312. The Seigniorship at Soulanges in Quebec was not granted to the **Sieur de Soulanges of Jemseg**, but to his son. The former was dead before the year 1702, for in 1691 his widow received a seigniorship at Jemseg (page 314).
- The Seigniorship of *Clignancourt*, did extend from the Grand Falls to Meductic, as shown by a reference in a memoir by Cadillac, (among the documents in the Legislative Library at Fredericton) who, in 1695, speaks of this seigniorship as extending "depuis la Sault de Medoctet jusqu'au grand Saut de la rivière St. Jean, les deux côtes de la rivière quarante lieues au moins de chaque côté avec trois lieues de profondeur."
314. The statement by Rameau that Vaudreuil possessed the seigniorship of Aucpac is confirmed by a note sent me by Rev. Dr. Raymond viz.,— Jean Pierre Danielou observes in a census made by him in 1739, "Monsieur Cavagnal de Vaudreuil gouverneur des Trois Rivières, est seigneur de la paroisse d'Ekoupag." (also his St. John River, 250). This no doubt was the Seigniorship of Vilrenard, granted 1697, which presumably was acquired by Vaudreuil through purchase.

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1. The location of the grant made by Richard Denys de Fronsac to the authorities of the Seminary of Quebec for a mission is happily made certain by the document mentioned on an earlier page and it was as shown on the Map No. 29. In the original document the limits are given thus:—"lesquelles trois lieues de terres Seront prises par moitié d'un Costé et d'autre de la dite Riviere Ste Croix. Et limitées ainsy qu'il Ensuit: C'est a Scauoir que du costé du Nord, delad. Riviere, les trois lieues de front Commenceront au Ruisseau Corneille en montant En haut d'icelles en la riviere appelée mûminagan qui se decharge en la dite Riviere Ste Croix, sur une lieue et demy de profondeur de ce Costé, par une ligne Establie nord et Sud qui se prendra au bord du dit Ruisseau a Son Entrée; Et de l'autre Costé delad. Riviere les trois lieues de terre de front commenceront a la meme ligne nord et sud mesurée diametralement a Celle du dit Ruisseau Corneille Sur meme profondeur (au Sud) de lieue et demy sur la dite ligne; laquelle Profondeur Sera limitée au bout de la dite lieue et demy (de chacun costé de la dite Riviere) par une autre ligne courant est et ouest, dans l'enceinte et limites desquels rhunds de vents entrent et sont compris la langue de terre qui fourche lesd. Riviere muminagan et ristigouche Et Se dechargent dans la dite Riviere Ste Croix, ensemble les Islets qui sont dans les d trois lieues d'Estenduë de long de la dite Riviere des Costés."

As in most early grants, its limits cannot be laid down **exactly** on the ground. An east and west course of the river seems to **have** been assumed, but this ignores the great curve in the Miramichi at this point. Hence the limits on the map are only conventional.

319. Additional information about Enault's lands at Miramichi, confirming Dionnes statement that he held the fief of Nepisiguit, is contained in an important document "Transactions des Srs de fronsac et Enaust" preserved in the Judicial Archives at Quebec, and for a copy of which I am indebted to the Keeper of the Archives, M. Philéas Gagnon. By this document it appears that Richard Denys had granted to Enault "une lieue et demy de terre de front sur lad. Riviere de Nepisiguit....sur autant de profondeur qu'il voudroit Selon letendue des de. terres" on certain easy conditions which were fulfilled until 1686, in which year Enault went to France. Later in connection with a reversion of ungranted lands to the Crown, Enault obtained a grant (Aug. 3, 1689) in Seigniorship from the government "de deux lieues de terre de front sur pareille profondeur" at the same locality, and apparently this had been excepted from the Seigniorship granted to Gobin in 1690. A complicated legal situation thus arose, which was settled by a compromise detailed in the document leaving Enault in possession of the land. This fully confirms the tradition given by Cooney (page 300 of *Historic Sites*) that he resided at the mouth of the Nepisiguit.

- 326C. **Burton.** Should read, "including most of the present Lincoln."

326. A valued correspondent, Mr. I. T. Hetherington of Jenkins, Queens County, writes me an account of a reputed "Old French" road between Anagance and Cumberland Bay via Riders Brook. His account of it is as follows; "Tradition and signs or marks establish the fact that the French had a well-defined road from the mouth of Anagance to the bend in Foleys [Riders] Brook and thence down the brook to its mouth. I remember well hearing the late John Rider when he was about 70 and I was 17, which would be about 51 years ago, say that when he was a young man it was no trouble to follow it the whole distance and that it had to all appearance been considerably travelled, as the remains of a lodging house was plain near the mouth of the brook about 8 or 10 miles from its mouth..... About 15 years ago I was coming down Foley Brook..... I found a stone chimney of large dimensions so large at that time a pine log was growing right up out of the chimney..... I have also heard that the French had a continuation of said road up Flat Rock Brook [a small stream below Riders Brook on North Side not marked on any map], to the head of Wasson Brook which empties into Cumberland Bay about one mile from the head of the bay. And it used to be supposed that that route from Anagance to Cumberland Bay formed the shortest route from Petitcodiac River to Fredericton, or possibly the fort at Jemseg."

No part of such a road appears to be now in use, but I have no doubt that it existed as described by Mr. Hetherington. But the utter lack of any reference to it in any document of the French period, and the inherent improbability that so long a road would have been cut at that time, when the Washademoac-Petitcodiac portage was in use, makes it seem likely it had another origin. And that origin I think is probably to be found in some connection with the attempts of the New Englanders against Fort Cumberland in 1776. As is well-known, and fully set forth in Kidder's "Military Operations," and in the "Memoir of Col. Johathan Eddy," a force of men from Machias joined by a few New Englanders and Indians from the St. John, under command of Colonel Eddy, went to capture Fort Cumberland in October, 1776. They went from the St. John to the vicinity of the fort in whale boats, but met with defeat which compelled them to return. Their route back to the St. John is not known, but as the Bay of Fundy was in possession of the enemy they probably came back by land. Having Indians with them it is possible they came by the route of this road, but of course would not then have cut out a road for so small a force. That winter, however, Colonel Eddy spent on the St. John planning another and stronger expedition against Fort Cumberland in the spring, an expedition which must necessarily have gone by land, the Bay of Fundy being in possession of the British. I think it extremely probable that the road was cut out during the winter as part of the plan to move a force against the fort in the spring, a design never executed.

Another early road, to the origin of which I have no clue is thus described by another correspondent, Mr. S. H. T. Sherwood of Poodiac, Kings County;— "A short distance to the north [of Poodiac] a high ridge running N. E. and S. W. is traversed by an old military

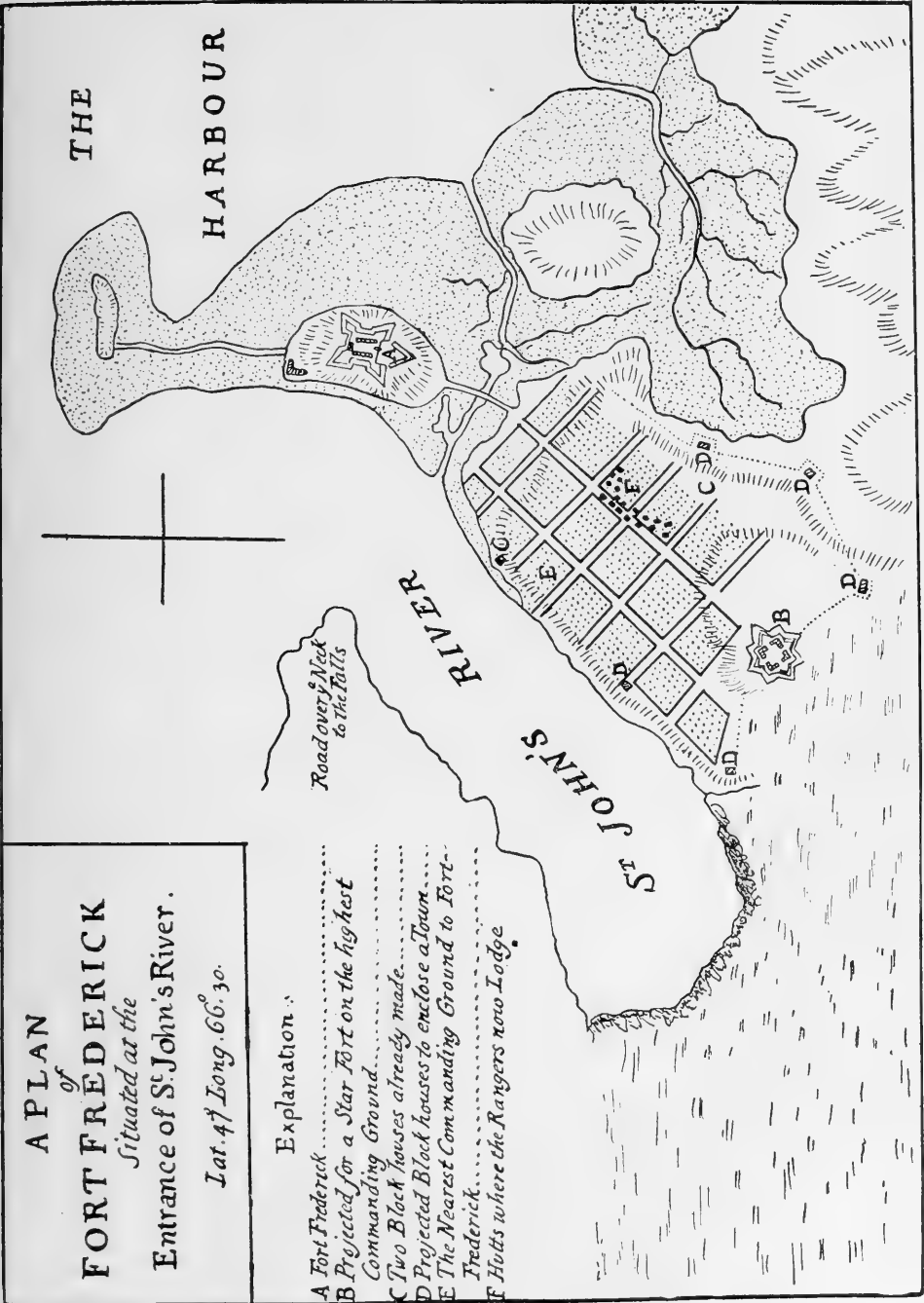
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road called "Cumberland Road" and leading from Fort Cumberland in Westmorland County to St. John, cut out by the returning forces after the fall of the said fort." There is evidently some confusion in the history here, since this fort never fell after 1755 and certainly the troops did not then traverse the woods to St. John. It seems to be the road between Campbell settlement and Wards Creek Settlement, but it is not a part of any old road that I can discover.

- 326A. **Fort Frederick.** A very interesting plan of the Fort and its surroundings, unknown to me when the original monograph was written, is contained in "A set of plans and forts in America reduced from actual survey, 1763. By J. Rocque" a copy of which is in the Library of Congress, and is reproduced herewith (Map No. 36). Compare also the Sproule plan of Map No. 23. The various projected works were of course never carried out. Of the two blockhouses (C) marked as "already made," the northernmost occupied the high land on water street where various military relics have been found, as noted earlier. The second blockhouse "already made," which must have stood about on the site of the Carleton Methodist Church, seemingly identical with the one at D, is, I believe, locally unknown.

In a St. John newspaper of Oct. 5, 1889, (apparently the *Globe*), there is an account of considerable value of the early appearance of Fort Frederick as remembered by an old resident. Another early newspaper scrap (undated) I have seen, gives a traditional account of the occupation of this fort in 1758, by the English. A very interesting diary of Sergeant John Burrell, stationed at this fort in 1759 is reprinted from the *New England Historical and Genealogical Register* for Oct. 1905, in *Acadiensis*, V, 291.

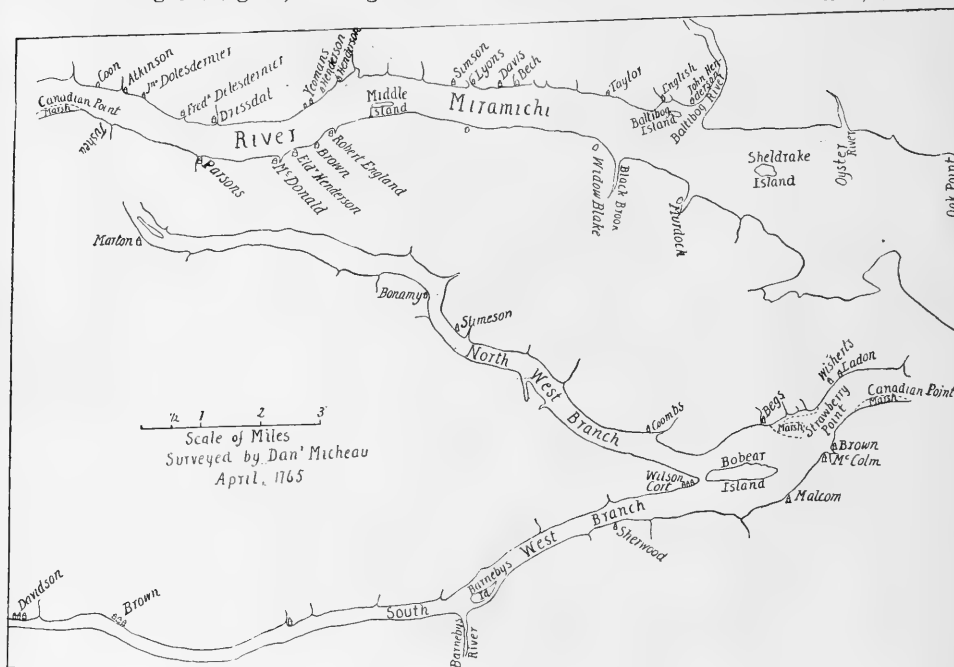
328. Mr. H. A. O'Leary informs me that about 1889 the *Moncton Transcript* reprinted from a Philadelphia newspaper an article descriptive of somewhat elaborate plans for the settlement by Pennsylvanians, in 1765, of the Petitcodiac, including a design for a city at the Bend (now the site of Moncton), the original map for which is still in existence. I have not been able by correspondence to gain further information on the subject.
330. The valuable map, showing the settlement of the Miramichi valley at the beginning of the Loyalist period, and before the arrival of any Loyalists, is reproduced herewith (Map No. 37). Though my copy is dated 1765, this is, of course, an error for 1785.
330. Much new and authoritative information about the settlement of Nepisiguit by Commodore Walker in this period is contained in the Documents noted in the Canadian Archives for 1894, pp. 300 et seq. for the use of copies of which I am greatly indebted to our Acadian historian, M. P. P. Gaudet. In synopsis the points important to our present purpose are these. A Memorial to the Lords of Trade by Walker himself seems to show that he had visited Bay Chaleur as early as 1763 to promote there, on his own account, a fishery trade. A document by John Shoolbred of 1775 shows that Walker had settled at



MAP No. 36. FROM ROCQUE'S "A SET OF PLANS," 1763; SLIGHTLY REDUCED.

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Nepisiguit in 1768 and established there (evidently on the well-known situation on and near Alston Point) a fishing and trading establishment. While absent in England in 1770 trying to obtain a grant of these lands, a Captain Allan, who had been in Bay Chaleur for two preceding years on a man-of-war, obtained from the Nova Scotia Government the 2000 acres well known as the Allan grant (shown on the map in Collections N.B. Hist. Soc. II, 126), and Walker had no alternative but to buy out his rights, which, by the aid of one Hugh Baillie of London, he did for the sum of £600. Walker and Baillie then proceeded, the latter supplying apparently the capital and the former acting as manager, to promote the settlement with great vigour, sending out between 1770 and 1773 no less than £10,000



MAP NO. 37. FROM A PLAN OF 1785; $\times \frac{1}{2}$.

worth of goods for trade. In 1773 all of Baillie's rights were bought out by John Shoolbred of London, and the settlement continued to grow, so that in 1775 Walker was resident there in charge of a well-equipped establishment, employing twenty British subjects, engaged in fishing, trading, ship-building, lumbering and, to some extent, farming. Nepisiguit at this time had a population of 70 souls, apparently inclusive of Acadians but not Indians. No further information occurs in this document, but as is well known, (related by Cooney, 172) the establishment was plundered and ruined in 1776 or 1777 by privateers from American colonies. No attempt was ever made, apparently, to reestablish the settlement. The Allen grant was not escheated until

Historic Sites.

1823, after which it was regranted thus originating the present Youghall settlement.

331. **Belledune.** There was here an early fishing establishment, for, as shown by a document in the Canadian Archives (1894, 301), in 1770 George Walker (prominent at this time in the settlement of Nepisiguit), applied for a grant of 1000 acres of land "at Belldown with the beach and pond where the said Walker has carried on his fishery and made great Improvements."
331. As noted earlier under Nepisiguit, Walker and Shoolbred were after 1773 in a kind of partnership, Shoolbred supplying the capital and Walker acting as resident manager. Hence there were not two, but a single establishment, at the mouth of the Restigouche, and even that is doubtful, for Shoolbred's Memorial of 1775 says there was then no settlement on either side of the Restigouche. Walker, as shown by the documents just cited under Nepisiguit, had established trading posts at Belledune and Nepisiguit between 1768 and 1770 and the presence of his name in *Walker's Brook* would suggest that he had also established a post at this place. The afore-mentioned documents show that it was on the ground of the success of the settlement at Nepisiguit that Shoolbred applied for the grant of the 500 acres "on the Nova Scotia side of the River Restigouche and adjoining to the old Indian Church," as Shoolbred's Memorial puts it. The beginning of the modern settlement of this region is related in the Settlements-origin Monograph, at pages 44 and 121.
332. **Grant 1.** On these grantees, see Archives, 1885, 177.
333. A Township, named Harrington, was laid out on the St. John River in 1732 (Nova Scotia Archives, II, 175), but apparently was never granted or settled. Its location is not known to me.
- Grant 16. The Ferguson grant was alongside, not identical with the Indian grant.
333. **Add, Oct. 18, 1765,** Nathan Frink and others 1975 ac. in Kings County.
334. **Grant 43.** On an old plan above Major Lochman's grant is 1000 ac. to Peter De Coutts, 1769.
335. **Grant 68.** There is much on O'Neal and this grant in Nova Scotia Archives, II.
336. **Grant 98a.** It is said locally this grant was never escheated, and the lands were taken up by squatters and are held to-day by possession.
- Grant 100** should read 500 ac.

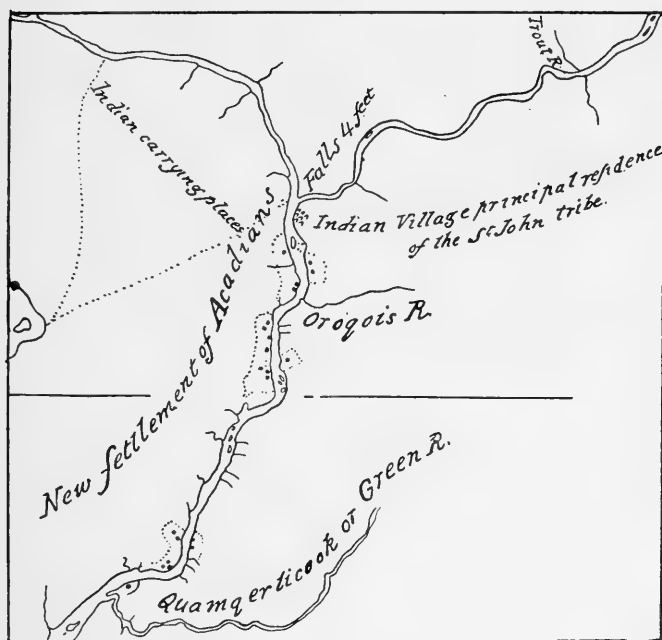
338. The extent and locations of the Loyalist Settlements formed along the St. John soon after 1784 are well shown on Sproule's fine map of the river, made from actual survey and observation in 1787. The part relating to these settlements is reproduced herewith (Map No. 38).

Historic Sites.

An important phase of settlement of this period is concerned with the formation of the Acadian settlements at Madawaska, which have been fully discussed in the Settlements Monograph. Happily the early extent and location of that settlement is well shown upon Sproule's Map of the St. John, of 1787, and the Madawaska portion is reproduced herewith (Map No. 39).

342. No 63 should read Kings Orange Rangers.

No. 76. Dr. Raymond tells me that DeLancey's 1st and 2nd Battalions were merged together as the 1st and settled at Woodstock, while the 2nd settled in Queens County, though lands were assigned them in York.



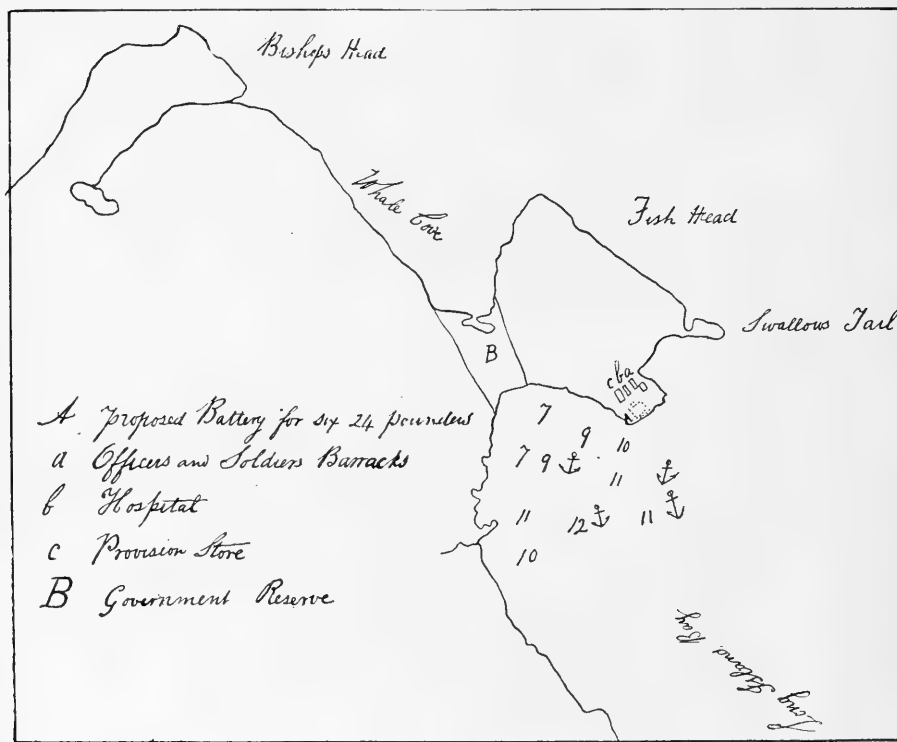
MAP No. 39. FROM SPROULE'S MAP OF 1787; $\times \frac{1}{2}$.

346. Much additional information upon the telegraph system from Halifax to Fredericton is found in letters in the Winslow papers, (consult Index), where it is shown that the line was to run by way of Sussex, that nine stations were selected between St. John and Fredericton, that others were to be established at Musquash, Lepreau and the South Wolf, and that the whole plan was abandoned at an early stage because of the expense and the lack of sufficient troops to work the system.

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347. The Edmundston Block-House is located exactly on the Graham and other detailed maps connected with the International Boundary Surveys. It is mentioned by Alexander in his "L'Acadie," II, 65, and a very full description of it when in use is contained in Lanman's "Adventures in the Wilds of the United States and British Provinces," 1856, I, 306.

Bouchette's map of 1831 marks Blockhouse at the present village of Petitcodiac, but I think this must be an error.



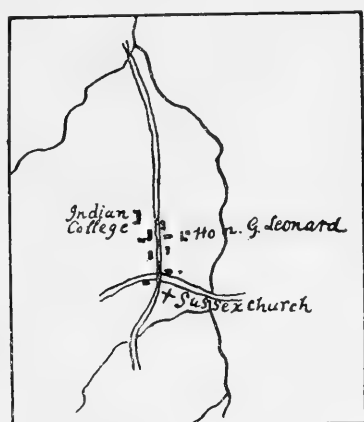
MAP NO. 40. FROM AN OLD PLAN; $\times \frac{1}{2}$.

347. About the year 1817 it was intended by the British Government to fortify Grand Manan, a large appropriation being made for that purpose. Several references to the plan occur in contemporary documents. It was carried at least so far that sites were selected and drawn upon maps, and the accompanying map No. 40, reproduced from one in the Crown Land Office, exhibits the proposed locations and plan.

Historic Sites.

349. The location of the Indian College at Sussex as here given is erroneous. Its true location is described in Allison's "Oliver Arnold," 19. Also I have found in the Crown Land Office an old map on which it is located, as shown upon the accompanying reproduction of a portion of it (Map No. 41).

349. Of very much importance in the early history of this period were the roads built between the principal centres of population. Much information about their general history is given in the Settlements Monograph. Their exact courses have largely been obscured by later alterations, but the following are the courses of those first built.



MAP No. 41. FROM AN OLD PLAN; ORIGINAL SIZE.

When the "present road" is mentioned in these descriptions, it means the present road though its general route, and through most, but not all, its actual course; many alterations in detail were later made to secure better grades etc.

(1) *The Westmorland Road.* It started at St. John, followed the present road along Marsh Creek, Coldbrook, Golden Grove, and Smithtown to Hampton, where it crossed at Hampton Ferry, kept the north side of the Kennebecasis to within three miles of Sussex, where it crossed to the south bank, and followed the present road through Sussex to Petitcodiac; it ran along the south side of that river part way, and later entirely, to Pollet River (this part now abandoned), then crossed to the north bank and followed the present main road through Moncton Memramcook Village, Dorchester, and Four Corners to Fort Cumberland.

It is shown on a fine large map (scale 2 miles to an inch) in the British Museum (Catalogue of Additions,—128, 238), "Sketch of the Road from Fort Cumberland to Fredericton, from a Journey Performed between the 13th and 23rd December 1799 by H. R. H. the Duke of Kent, Commr. in Chief in British N. America." The Duke

Historic Sites.

of Kent passed over this road from Fort Cumberland to the "Finger Board" and thence to Fredericton in 1799. Parts of it must then have been a mere trail through the woods: thus the part from Anagance to Kennebecasis was not constructed until 1802.

(2) *The Fredericton road (east)*. This left the Westmorland road two and a half miles beyond Hampton ferry, (with later a branch, facilitating travel from Fredericton to Westmorland, from five miles beyond at the "Finger Board," joining near Belleisle Corner), through Belleisle Corner, Scotch settlement, California settlement later with a branch to mouth of Washademoac, across the Washdemoak north of Lewis Cove, to Jemseg ferry, thence across the Jemseg and through Mougerville to St. Marys.

(3) *The St. Andrews road*. This followed the present highway to Lepreau, beyond which it appears to have run between the present back and coast roads, the present back road having been laid out by Campbell in 1803. From St. George to St. Andrews it followed the present route.

(4) *The Fredericton and St. Andrews road*. It ran through New Maryland to Tracy thence to Piskahegan, Pleasant Ridge, Rolling Dam, Waweig and by the river road to St. Andrews. (In 1806 the road had been constructed from St. Stephen to Oak Point, whence a ferry crossed to connect with the St. Andrews road).

(5) *The Quaco road* appears to have followed the roads nearest the present St. Martins and Upham railway.

(6) *The Western road to Fredericton*, followed approximately the present river road.

(7) *The Canada road* left Fredericton, followed the west bank to Burgoins ferry, crossed to the east bank which it followed to Bull's Creek, when it recrossed to the west bank, which it followed all the way to Madawaska, where it crossed the St. John and ascended the Madawaska along the western bank of that river by the present road.



NO. 42.—MITCHELL'S MAP.

V. ADDITIONS AND CORRECTIONS TO THE MONOGRAPH
ON EVOLUTION OF THE BOUNDARIES.

228. A later discussion of John Mitchel's relations with the St. Croix of the Nova Scotia-Massachusetts Boundary is contained in "John Mitchel's Diary and Field Book of his Survey of Passamaquoddy in 1764" in the Collections of the N.B. Historical Society, II, 175.

239. An examination of the Bernard Papers preserved in the Harvard College Library throws some light upon the relation of Governor Bernard to the grant on the River St. Croix and his idea of the location of that river. They show that he did not apply for the grant for himself but for some of his friends and that his name was included in the grant by the Nova Scotia authorities, and that, further, he deferred to the opinion of the Nova Scotia authorities as to the identity of the River St. Croix, accepting with them the Cobscook.

338. Another view of the spirit shown by Maine in the boundary controversy is given by Burrage in Coll. Maine Hist. Soc., 3rd Ser., 1904, 353.

356. As here noted there is preserved in the British Museum a copy of Mitchell's map which is without doubt that used by the British Commissioners in their negotiations in 1783. On it there is marked a boundary line along which is written, in the handwriting of King George III, himself (Windsor, Narrative and Critical History of America,¹ VII, 181) "Boundary as described by Mr. Oswald." Further, it is known that this map embodies changes made after Mr. Strachey the other commissioner reached Paris and hence it represents the line agreed to by the British Commissioners (Fitzmaurice, Life of Lord Shelburne, III, 295, 324). Naturally therefore this map must represent the International boundary as understood both by the Commissioners and by King George III. I have the good fortune to be able to present a photograph of this map herewith (map No. 42), which has been taken for me with the kind aid, and under the expert direction of Mr. Basil Soulsby Keeper of maps in the British Museum. It will be seen that the boundary as marked concedes essentially the American claim.

359. A valuable contribution to the still unsettled question as to the nationality of Mark Island near Campobello, hence having an important bearing upon the settlement of the final water-line, occurs in the Ms. Minutes of Council respecting allotments of land, (preserved

¹ Compare also Benton's "Thirty Years' View," Vol. II, 422, which seems to make this point plain.

Boundaries.

at Fredericton), Vol 10, page 39, where under date Feb. 18, 1803, this island though without a name, is plainly designated and ordered granted the Owens. The grant itself (among the documents of the Crown Land Office), is dated June 12, 1806 and distinctly grants Mark Island, and by name, to the Owens. This grant antedates the earliest record of possession cited by the American Commissioner. There is also much material relative to the ownership of the island in the David Owen Ms. Letter books preserved in Boston by the Campobello Company.

369. Apparently the word "on Tidnish River" should read "and Tidnish River," for in 1862 a supplementary act was passed by the New Brunswick Legislature explaining the Act of 1859, and interpreting the words as "and Tidnish River."

421. An earlier printed map, attempting to show the County lines, is a Wyld map of 1825 in the Library of the Department of State at Washington. But it has them very erroneously both as to position and direction.

423. I have found among documents in the office of the Provincial Secretary at Fredericton the dates (in 1785) of erection of the remaining counties (except Queens) as follows:—Westmorland, May 19; Northumberland, June 10; Kings, July 4; York, July 25.

426. The Kent-Northumberland line does not extend to Escuminac, but, by act of 1888, ends where it reaches the sea shore south of the cape. The change was made of course in order that the small strip at the cape south of the former line might not be isolated.

440. Add to the Parishes of Gloucester, Bathurst. Erected 1826.

VI. ADDITIONS AND CORRECTIONS TO THE MONOGRAPH ON ORIGINS OF SETTLEMENTS.

37. The statement that an Acadian settlement occurred above Doaktown proves to be an error; see earlier under Historic Sites in these addenda.

46. An important epoch in the settlement of the Acadians in New Brunswick after 1763 was marked by an order passed July 11, 1764, by the King in Council, approving the recommendation of the Lords of Trade that should the Acadians take the oath of allegiance they should be allowed to settle in Nova Scotia, but that they should be dispersed in small numbers in various localities (Coll. N.B. Hist. Soc. II, 313). From this order dates the legal repatriation of the Acadians.

76. A full account of the formation of the "Fredericton Emigrant Society," an organization of considerable importance in this period of New Brunswick colonization is given in the Royal Gazette, August to December, 1819 (especially Aug 10 and 17 and Nov. 30 and Dec. 7.) Also a "St. Andrews Agricultural and Emigrants Society" was formed about the same time, and an account of its founding is in the same paper for Jan. 18, 1820.

83. Among disbanded regiments settled in New Brunswick appear to have been many Waterloo veterans, at Irish Settlement and elsewhere in Kings and Queens County. I have no further information as to the time or manner of their arrival, and it is possible they came and were granted land as individuals, and not in a body. A number of British man-of-war-men settled at Miscou, Caraquet and Pokemouche.

To the literature relating to the New Brunswick and Nova Scotia Land Company should be added, the reference in Munro's "New Brunswick," 167, and a well-engraved map, dated 1836, scale 6 miles to the inch, entitled,— "New Brunswick and Nova Scotia Land Company. A Map of the Company's Tract of Land in the Province of New Brunswick." This map gives a good deal of information about the Company's property,— of very roseate hue. It is the map which first places a great abundance of lakes on the upper branches of the Miramichi, a feature which persisted unto later maps.

87. The settlement of the Province by Associations, a plan to some extent still in vogue, was originated by Governor Colebrooke (1841-1848) and was sometimes known by his name, as noted in various documents of the time.

Settlement-origins.

114. **Bass River Settlement,—G.** An expansion chiefly from Miramichi of English and Irish settlers after the fire, who settled along this then new road. (Loc. inf.).
115. **Bay du Vin,—N.** First settled by Loyalists, but joined later by various immigrants and native expansion from Miramichi. A history of the settlement with an historical map, is expected to appear in the Magazine "Acadiensis," St. John, Vol. VII.
115. **Beaubears Island,—N.** Its modern settlement dates apparently from considerably before 1800 when James Fraser from Scotland established here a shipbuilding and mercantile business, and in 1805 built the stone house still standing (of stone imported from Aberdeen). Later it was sold to John and Alexander Fraser who continued the business, and later it passed through the hands of various owners, Harley, Russell and others, and long continued the site of shipbuilding and trading. Originally, when all travel was by water, it was a very valuable situation for trade, but improvement in land communication caused its abandonment. The stone tomb on the island is that of Joseph Russell L. D. S. [Latter Day Saint]. (Loc. inf.)
118. Bonum Gould should read **Bon homme Gould.**
119. **Buctouche,Kt.** A history of the settlement, with an historical map is expected to appear in the Magazine "Acadiensis," St. John, Vol. VII.
119. **Burnt Church,—N.** A History of the settlement, with an historical map, is expected to appear in the Magazine "Acadiensis," St. John, Vol. VII.
121. **Campbelltown.** This settlement of the N. B. and N. S. Land Co. seems to have been on the East, not the West, side of the Miramichi.
121. **Campbell Settlement,—K.** This settlement is not native expansion, as here stated, but was formed homologous with the Scotch and Irish settlements on the Kings-Queens Boundary, by immigrants from the Highlands of Perthshire, Scotland, with some north of Ireland Irish, as I am informed by Rev. Chalmers Jack.
122. **Caraquet,—G.** As noted earlier in this paper, under Historic Sites, the sailors of the St. Simon, founders of Lower Caraquet, were not from France but were Acadians from Restigouche. A history of the settlement, with an historical map, is expected to appear in the Magazine "Acadiensis," St. John, Vol. VI or VII.
124. **Cocagne.** A history of the settlement, with an historical map, is expected to appear in the Magazine "Acadiensis," St. John, Vol. VII or VIII.
127. **Doaktown,—N.** On an error as to the French settlement see earlier, under Acadian Settlements.
- Dorchester,—W.** To the references add, "Dorchester Records" in Chignecto Post, July 17, 1884.

Settlement-origins.

130. **English Settlement**, on the Northwest Miramichi. Settled by English immigrants, who came 70 years ago and settled around the Methodist Church still in existence near Chapel Island.
130. **English Settlement,—K.** This settlement was not principally of York-shiremen, though it included one or two such settlers, as I am informed by Professor W. C. Murray, a descendant of some of the founders of the Settlement. They were chiefly from the North of England, with some lowland Scotch. The detailed information supplied me by Professor Murray about this settlement I expect to publish later elsewhere.
131. **Escuminac,—N.** The English-speaking settlers are in part Scotch and Irish immigrants and in part native expansion. A history of the Settlement with an historical map, is expected to appear in "Acadiensis," St. John, Vol. VII.
131. **Ferriebank,—C.** Rev Mr. Ferrie was a Presbyterian clergyman.
136. **Gretna Green,—N.** A name used before the Great Fire for Douglastown, which was thus named shortly prior to the Fire on the occasion of the visit of Sir Howard Douglas.
141. **Irish Settlement,—Q.** Some of its Irish settlers were veterans of Waterloo, as I am told by Rev. Chalmers Jack.
147. **Martins Head,—J.** On this settlement I find the following note in an early Report in the Crown Land Office;—"No improvements appear in Cox's late grant except those made by LeBaron and Edwin Hazen, or at their expense. It is my duty to add that these gentlemen began a difficult and expensive settlement on this desolate part of the Bay, in October 1806—and that they have since persevered in their Buildings and improvements with Industry and spirit which I have not seen surpassed in any new settlement in the Province."
148. To the references here given on the history of Maugerville should be added the matter in "Sketches of New Brunswick," 102-103 and Raymond, in the Coll. N. B. Historical Soc. II, 287.
150. **Miramichi,—N.** In this brief discussion I have underestimated the importance of the Irish immigration to Miramichi, which I find on further study was greater than the Scotch. Further the spread of settlers from this valley to other localities on the North Shore was greatly hastened by the Great Fire, after which many settlers sought new homes, especially in parts of Gloucester. On the riots of 1822 see Acadiensis, VI, supplement, 109. At the advent of the Loyalists there were at Miramichi according to the Mischeau Map earlier given (Map No. 37), some 30 families, while Marston in the same year estimated them at less than 100 (Coll. N. B. Hist. Soc. II, 93).
150. **Miscou,—G.** An outline of the history of this Island, with especial reference to the founding of its modern settlement, illustrated by an historical map, appeared in the Magazine "Acadiensis," Vol. VI, 79.

Settlement-origins.

151. **Moorfields,—N.** A settlement before the Great Fire, now included in Douglastown. It is mentioned several times by Cooney.
152. **Napan,—N.** Dates from about 1818, for the Royal Gazette of 1819 speaks of the "new settlement near the head of tide on the Napan."
153. **Neguac,—N.** A history of the Settlement, with an historical map, is expected to appear in the Magazine "Acadiensis," St. John, Vol VII.
153. **Nelson,—N.** There was a Roman Catholic chapel at Nelson as early as 1811 (Plessis, 173), and it was this chapel without doubt which attracted here so many Irish settlers. Important matter on a possible early mission here will be found earlier in this paper under Acadian settlements and seigniories.
160. **Pokemouche,—G.** A history of the settlement, with an historical map, is expected later to appear in "Acadiensis," St. John, Vol. VI or VII.
161. **Pokesuedie,—G.** An expansion from Caraquet, as the names of grantees show very clearly.
161. **Presquile,—Cn.** Some description of this Post occurs in verse in "Lays of the Wilderness," St. John, 1833.
162. **Renous,—N.** Of later settlement than here given, for Cooney gives no settlement along the river in 1832.
163. **Richibucto,—K.** Interesting matter on the trade of this place is given in Journals of the House of Assembly, 1885, Appendix CCXCVI. An account of the Founding of Richibucto appeared in the Moncton Transcript in May last and was reprinted in the Richibucto Review. A history of the Settlements, with an historical map, is expected to appear in the Magazine "Acadiensis," St. John, Vol. VI or VII.
164. **Richibucto Village,—K.** An important document on this settlement appears in the Journals of the House of Assembly, 1855, Appendix, CCLXXXIV.
165. **Rothsay,—K.** From local information I hear that the settlers of the upper part of this parish, and extending into Hampton were from New York and New Jersey, and included a good many of German names. It is said these settlers referred to the Kingston settlement, formed by Loyalists from Connecticut, as "The Yankee Shore."
168. **St. Josephs,—G.** A thriving new Acadian settlement on the Caraquet Railway between Burnsville and Grande Anse; apparently formed by expansion from neighbouring settlements.
170. **Salt Springs,—K.** Settled by immigrants from the highlands of Perthshire and North of Ireland, homologously with the Scotch and Irish settlement on the Kings-Queens Boundary, as I am told by Rev. Chalmers Jack.

Settlement-origins.

171. **Shediac,—W.** There is a note on the English residents in 1805 in *Acadiensis*, V, supplement 85. A history of the settlement here, with an historical map, is expected to appear in the same magazine, Vol. VI or VII.
172. **Shippegan,—G.** A history of the settlement of the island, with an historical map, is expected to appear in the magazine "*Acadiensis*," St. John, Vol. VI or VII.
176. **Tobique River,—V.** There is interesting matter on the settlements here in *Journals of the House of Assembly*, 1855, Appendix CCCXXXVIII.
176. **Tracadie,—G.** A history of the settlement, with an historical map, is expected to appear in the magazine "*Acadiensis*," St. John, Vol. VI or VII.
175. **Tabusintac,—N.** A history of the settlement, with an historical map, is expected to appear in the magazine "*Acadiensis*," St. John, Vol. VI or VII.
185. Date of the Winslow Papers should read 1776-1826.



MONOGRAPHS

OF THE

Place-nomenclature, Cartography, Historic Sites,
Boundaries and Settlement-origins of the
Province of New Brunswick

WITH

A Supplement Thereto, and a Plan for a General History
of the Province

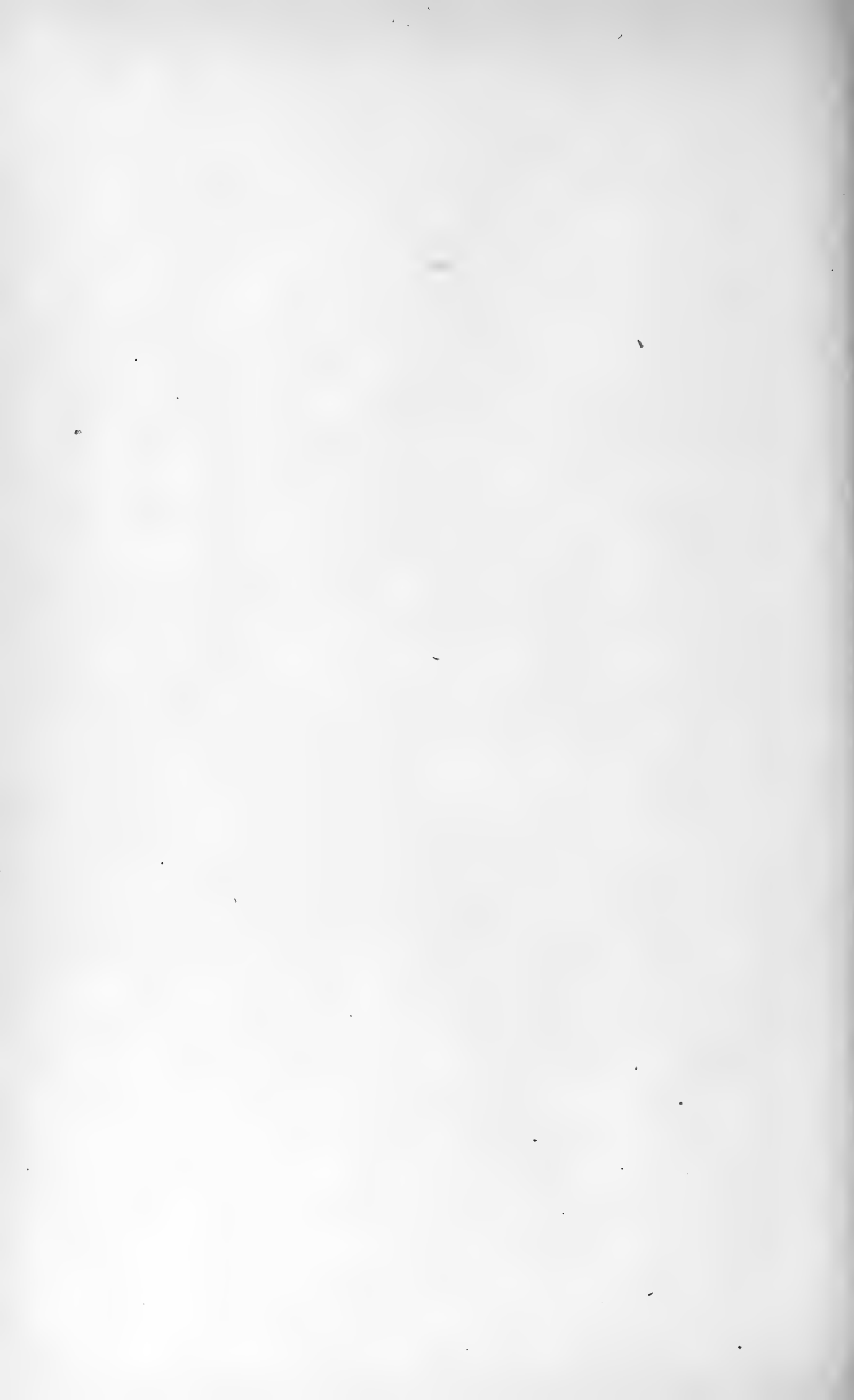
(Contributions to the History of New Brunswick, Nos. 1-7)

BY

WILLIAM F. GANONG, M.A., Ph.D.

TRANSACTIONS OF THE ROYAL SOCIETY OF CANADA

1895-1906



PREFACE

It is with much satisfaction that I am able to complete this series of Monographs which were designed to cover the various phases of the historical geography of New Brunswick. The study has been necessarily almost entirely archæological, dealing with matters often of small moment in themselves, but possessed of a dignity as an integral part of a worthy subject. I feel with Churchyard, who said over four centuries ago,—“I study to bring forth some acceptable work: not striving to shew any rare invention that passeth a man’s capacity, but to utter and receive matter of some moment known and talked of long ago, yet over long hath been buried, and, as it seemed, lain dead, for any fruit it hath shewed in the memory of man.” I thoroughly believe that in local history it is the archæological phases which are of greatest interest to the most people, and that these form the best links to connect the intangible past with the visible present. Our local historians would be wise did they but make more use of them. These studies may serve to aid the New Brunswick historian of the future even should I not be able, as I hope I may, to make further use of them myself.

My mode of treatment of the subject, in separate and widely spaced papers, though excused by necessity, has had decided drawbacks. Thus it has involved some repetition, and the present cumbersome supplement. And besides, my classification of the materials is, I see now, needlessly complex, especially in the Historic Sites and Settlements Monographs. The student therefore may have difficulty in finding special items he may seek, and I advise him not to yield to discouragement if a desired subject is not found where he looks first. Futhermore, I am now trying to render him a certain, even if somewhat belated aid in this respect. First, the Additions and Corrections forming the final paper match page for page with the original monographs, and give a good many cross references. The reader in using the papers, should always consult the original monograph and the supplement together page for page. Second, I have added a full table of contents which in a general way may to some extent replace an index of subjects. All of those who possess separate copies of the Monographs, and who may think them worth binding together will find it best to place the accompanying Title-page, this preface and the following Table of Contents at the beginning

of the somewhat portly volume, the "Additions and Corrections" being of course placed after the other monographs. Although additional data will undoubtedly come to knowledge in the future (and needless to say all such will be very welcome to the author), I shall present them elsewhere, probably in local publications; at all events, I do not design to add another to the present series, which is thus definitively closed.

I desire to take advantage of this opportunity to express my sense of deep personal obligation to the two Honorary Secretaries of the Royal Society, the late Sir John Bourinot and Dr. S. E. Dawson. From both of them I have received, during the publication of these papers, the ready sympathy of fellow students as well as the helpful consideration of skilled editors. For any value the completed work may have, the student must thank them and the Royal Society as well as the author.

March 17, 1906.

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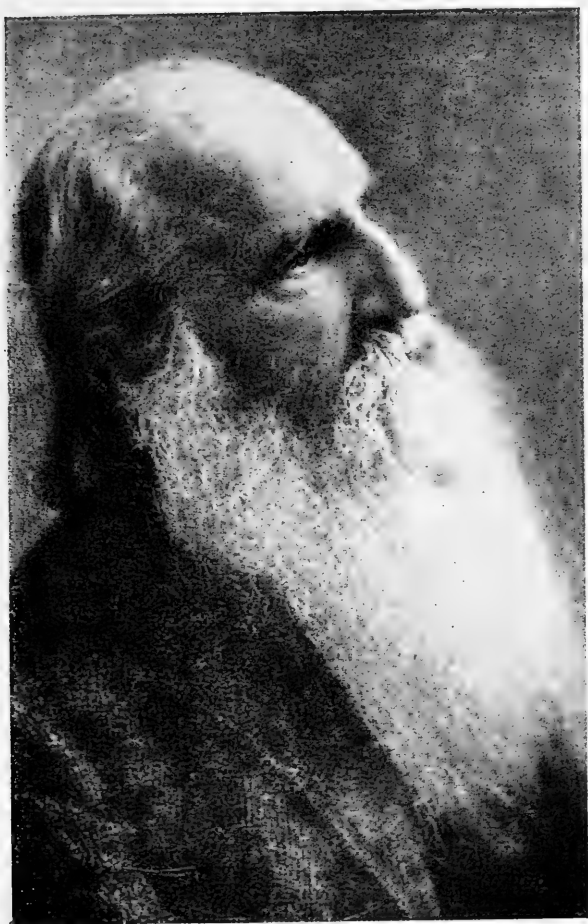
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[COYNE]

RICHARD MAURICE BUCKE—A SKETCH



RICHARD MAURICE BUCKE.

II.—*Richard Maurice Bucke — A Sketch.*

By JAMES H. COYNE, M.A.

(Presented by W. W. Campbell, and read May 23, 1906.)

1.

In the preparation of the following sketch, the writer had access to documentary material in the possession of the family of the late Dr. Bucke. Much of this material was autobiographical, and in using this the plan has been adopted, as far as possible, of letting the subject of the memoir tell the story in his own way, with such omissions, chronological rearrangement and explanatory connecting links as the nature of the case seemed to require, regard being had to the necessary limits of this paper. Quotation marks are not always used, especially where, as in the case of the fight with the Shoshones and the adventure in the Sierra Nevadas, the narrative is simply condensed from Dr. Bucke's detailed description. Where quotation marks are used, the passage is autobiographical, unless otherwise stated.

2.

Richard Maurice Bucke was a man of marked personality.

His individuality impressed itself on all who came into contact with him. Of striking presence, great native ability, wide and varied experience of the world and of human nature, he distinguished himself in more than one line of thought and action. For many years medical superintendent of one of the largest asylums for the insane in Ontario, he was ranked among the foremost alienists in America. An original investigator in the fields of medical science, philosophy and literature, he worked out his problems with a single eye to the truth, and, having solved them to his satisfaction, presented the processes and his conclusions frankly and fearlessly, leaving the results with the future for acceptance or rejection. His intellectual product is intimately related to his close association for a quarter of a century with Walt Whitman, whose influence was profound and lasting. The names of Whitman and Bucke are inseparably linked together for all time. The story of their friendship is of permanent interest and value.

As a *littérateur*, scientist and administrator, and as the biographer and close friend of Whitman, Dr. Bucke was a familiar figure in many circles, both in Canada and in the States.

But to the public at least it was not generally known that he had had a youth of extraordinary adventure, characterized by thrilling

incident, intense suffering, prolonged and arduous struggle. These experiences were important factors in the development of a type of manhood worthy of being studied.

Some stages and phases of that development it will be the work of the following pages to attempt to portray.

3.

At the Church of St. Olave, Old Jewry, London, on the 4th of May, 1801, Thomas George Bucke, of Mildenhall, Norfolk, married Georgina Walpole.

Three children were born of this marriage. All received a good education. Horatio Walpole, eldest child and only son, was educated at Trinity College, Cambridge, took holy orders, and was appointed curate of the neighbouring village of Methwold. He married Clarissa Andrews, whose brother, Biggs Andrews, K.C., was a barrister of some eminence.

To the Reverend Horatio Walpole Bucke and Clarissa, his wife, were born six sons and four daughters.

It was at Methwold that their seventh child and fifth son first opened his eyes to the light on the 28th day of March, 1837. Of this son, Richard Maurice Bucke, it is proposed to speak in the following memoir.

Through his mother, Horatio Walpole Bucke was a great grandson of the famous Prime Minister of England, Sir Robert Walpole, and a grand nephew of Horace Walpole, whose Letters have given him a niche in the pantheon of English literature. On the side of the Buckes also literature had its representative. Charles Bucke, a brother of Thomas George, was the author of "Beauties of Nature," and "Ruins of Ancient Cities," books which continued to be published until nearly the end of the last century. The tendency to literature of the subject of this sketch was therefore part of his inheritance.

4.

In the spring of 1838 the curate, with his wife and seven children, emigrated to Upper Canada. For a score of years general attention had been directed to the Talbot settlement. Perhaps the familiar nomenclature, reproducing the names of counties, cities, towns and streams belonging to the eastern part of England added to the attraction. On the river Thames, in Upper Canada as in England, were the counties of Oxford, Middlesex, Kent, and Essex. In the township of Lon-

don Richard Talbot¹ had taken up land twenty years before, and settlement had proceeded apace. His son, E. A. Talbot, was one of a number of writers by whom the praises of the Talbot Settlement were sounded in books which were extensively circulated in the British Islands.

To the township of London Mr. Bucke proceeded with his family to spy out the land, if it was good.

At the forks of the Thames the town of London had already more than twelve hundred inhabitants, ministered to by five churches, seven taverns and three or four schools. Two or three miles east, on Dundas Street, was a farm which caught our immigrant's fancy. He purchased it and settled down to the life of a pioneer farmer. A scholar and linguist, he had brought with him a library of several thousand volumes, in which no less than seven languages were represented. Here in the midst of the primeval forest he installed his family and his books; here three children were born to him; and here, in the gradually widening clearing he passed the remaining years of his life. The property, known afterwards as the Creek Farm, is now the site of the village of Pottersburg, a suburb of the city of London.

5.

The Reverend Mr. Bucke was master of seven languages: Latin, Greek, Hebrew, French, Italian, Spanish and English. The education of his six sons was, however, left largely to chance. That is to say, he taught each of them to read in one or more languages, and then, turning them loose in his library, left them to shift for themselves. But, to use Maurice's own words, "they were born with the desire to know, and with the instinct to find out." Each was thenceforward his own schoolmaster. Of the six sons, three became physicians and one a lawyer. The eldest brother, George Walpole,² died comparatively young.

Maurice learned Latin from his father. Browsing among the thousands of books, breathing their atmosphere, he became saturated with literature of wide range and varied character. A better foundation could hardly have been laid for his professional and literary life-work, which was to demand a comprehensive knowledge of the mental and moral nature of man.

¹ Not to be confounded with Colonel the Honourable Thomas Talbot, founder of the Talbot Settlement, which included twenty-eight townships in whole or in part.

² The following entry in the family Bible is of historical interest: "George Walpole, born Milden Hall, County Norfolk, 14 June, 1828; inoculated 28 February, 1829; recovered from the small-pox, 21 March, 1829."

He never went to school, in the ordinary sense of the word; but his education was, notwithstanding, productive in results that could not easily have been surpassed, had he attended in boyhood the regular institutions of learning.

His early life is described by Dr. Bucke as follows:

"He was born of good middle-class English stock and grew up almost without education on what was then a backwoods Canadian farm. As a child he assisted in such labour as was within his power. Tended cattle, horses, sheep, pigs; brought in firewood, worked in the hay field, drove oxen and horses, ran errands. His pleasures were as simple as his labours. An occasional visit to a small town, a game of ball, bathing in the creek that ran through his father's farm, the making and sailing of mimic ships, the search for bird's eggs and flowers in the spring, and for wild fruits in the summer and fall, afforded him, with his skates and handsled in the winter, his homely, much-loved recreations. While still a young boy he read with keen appreciation Marryat's novels, Scott's poems and novels, and other similar books dealing with outdoor nature and human life."

The great problems of religion presented themselves to him even as a child:—God, Jesus Christ, immortality, eternal suffering.

"The boy (even the child) dwelt on these and similar topics far more than anyone would suppose; but probably not more than many other introspective small fellow mortals. He was subject at times to a sort of ecstasy of curiosity and hope; as, on one special occasion, when about ten years old, he earnestly longed to die, that the secrets of the beyond, if there was any beyond, might be revealed to him; also to agonies of anxiety and terror, as, for instance, at about the same age, he read Reynolds' *Faust*, and being near its end one sunny afternoon he laid it down utterly unable to continue its perusal, and went out into the sunshine to recover from the horror (after more than fifty years he distinctly recalls it) which had seized him."

At the age of fifteen he read the "*Vestiges of Creation*," a well-known precursor of Darwinism. His inclination to philosophy and science was thus manifested at an early period of his life.

6.

Maurice's mother having died, his father married a second time, and in 1853 he too died. Maurice, then 16 years of age, decided to see the world for himself, and seek his fortunes wherever circumstances seemed propitious.

The next five years were years of varied and remarkable adventure. Crossing Lake Erie, one June day, he lived for three years in the Ohio and Mississippi valleys, working at any employment that offered.

At Columbus he was a gardener; near Cincinnati he worked first on a railroad, and then as a farm hand. In the winter of 1854-5 we find him making staves in the cypress swamps of Louisiana. Then for another twelve-month he served as fireman or deck-hand on steamboats plying on the Mississippi and Ohio rivers. But his longing to know the world and men was by no means satisfied. He was now just entering on his twentieth year, in the full vigour of early manhood, ready as ever for anything that promised novelty or adventure. Fortune took him at his word.

Ascending the Missouri river to Fort Leavenworth, he determined to cross the plains and mountains to the Pacific. To carry out his purpose he hired with the conductor or manager of a train of twenty-six loaded freight waggons, consigned to a mercantile house in Salt Lake City. Each waggon was drawn by six yoke of oxen, and carried from three to four tons. It was a wearisome, difficult and perilous trail: for in 1,200 miles there were no white inhabitants, except at Fort Carney and Fort Laramie, the roads were bad, the loads heavy, and oxen at best are rather sure than swift as draught animals. The journey occupied five months; nowadays it would require less than two days. The party found Indian camps near the forts; the Pawnee nation at Fort Carney, and a large party of Sioux at Fort Laramie. They passed through immense herds of buffalo on the Platte, as Parkman had done a few years before. They crossed the Rockies by the South Pass and Green river; the Wahsatch Range by Echo Cañon.

From the summit of the Wahsatch he saw spread before him the rich, spacious and beautiful country of the Mormons, with the Great Salt Lake in the blue distance beyond. The splendid picture never faded from his memory.

The wondrous scenery of the Rockies was a revelation, which the impressionable youth absorbed into his soul. In his later years he recorded with enthusiasm the effect produced upon him by its grandeur and its beauty.

7.

At Salt Lake the party received their five months' pay; but none thought of turning back. Westward still their gaze was fixed, and with eagerness they pressed toward the setting sun.

Four hundred and fifty miles farther on was Sam Black's trading post, a solitary house, with its sheds and outbuildings on the sink of the Humboldt, and there was no white settler between. On the other hand, the Indians were hostile and in a position to choose their own fighting ground.

"We formed ourselves," says Bucke, "into parties of from five to ten men in each. Each party bought a light waggon and two horses to draw it. Into this were loaded the necessary provisions, cooking utensils and personal effects of the party. One of us, turn about, sat in the waggon and drove, the rest walked."

Unwisely, as it turned out, the parties travelled in detachments. The party of which Bucke was a member numbered ten. They chose a man named Samuel Jamieson as captain. Crossing the Humboldt mountains, and then following the river of the same name to the westward, they were attacked by the Shoshones. Columns of smoke here and there along the river uplands gave the signal to the swarthy foe. "Then I heard, for the first time in my life, from a hundred savage throats, that most unpleasant of sounds, the Indian war-whoop." The ranks of Bucke's party had been swelled and their scanty supply of provisions depleted by the addition of a party of six, who had been robbed of everything by the Indians, and fallen back for help and food. For a full half-day a running fight ensued with a hundred naked savages, "yelling the war-whoop at the top of their voices." The Indians had few guns, and depended mainly on their bows and arrows; the whites had five rifles, a shot gun and two revolvers. The latter reserved their fire until it was likely to prove effective. One of them was wounded with an arrow, another with a rifle-ball in the groin. The whites were the better strategists, economized their fire, were cooler, and shot straighter. Bucke believed he had hit one or more of the enemy. Rushing toward the bushes to capture the gun of one of these, he was peremptorily recalled by the captain. "At the time the Indians abandoned the fight we had our last bullets in our guns and they were not all loaded."

But their troubles were by no means over. They had forgotten to fill their water cask in the morning. The trail had left the river. Thirsty and exhausted they toiled wearisomely in the hot sun, on the hot sand, "with nothing in sight but sand, sage brush and here and there rocky hills." It was 9 at night before the trail again struck the river. Their suffering had been intense, and Bucke describes it in a most graphic manner. The craving for water was such that enormous quantities of it were swallowed before their thirst was satisfied. Then followed six more days of hunger and privation, during which they marched about 150 miles, with nothing to eat but a little flour stirred in boiling water. They arrived at Sam Black's almost exhausted with want of food. "Naturally, the first thing we did was to arrange for supper. Inside of two hours after our arrival we sat down to a table loaded with meat, game, vegetables and hot biscuits,

and it is needless to say that we did full justice to these and the hot coffee served with them."

Two days later members of the third and fourth parties came in. They had been less provident in their supplies, and less fortunate in fighting than Bucke's party. The Indians had robbed them of everything; five of their number were killed or missing; the rest had travelled 175 miles, practically without food, except some seed-pods and a duck they had killed.

8.

His next occupation was that of a gold miner.

After a few days' rest, he writes, "We crossed the great American desert from the sink of the Humboldt to the Carson river and marched up the Carson to Gold Cañon." They sold their horses and waggon; some of them, including Bucke, took up claims, bought mining tools, "and settled down to work gold mining."

Gold Canyon he describes as "a broad and shallow ravine, dry in summer, but, in winter, spring and fall, sending a diminutive tribute of muddy water to the Carson river." Here he remained about a year, "a member of a small community who, by the aid of rockers, toms, and sluices, extracted a precarious livelihood from the placer diggings." The miners numbered three or four dozens in all; the whole settlement, including ranchers, about one hundred, "scattered over a country thirty or forty miles across in each direction. To the east, our nearest neighbours lived seven hundred miles distant, on the shore of the Great Salt Lake; across the mountains to the west, we reached by a walk of a little over a hundred miles the westernmost mining camps of California; north and south as far as our knowledge extended the barren slopes of the foot-hills were still in the undisturbed possession of Washoe and Piute Indians; along the highlands towards the head of the cañon, where now stand Virginia City, Silver City and Gold Hill, the mountain sheep suckled her young, unmolested except by the gray wolf."

"The social state of this small community," says Bucke, "was genuinely Arcadian in its simplicity. No civil, military or ecclesiastical organization existed among us. Utah Territory, in which we lived, had at that time no laws or courts, and Gold Cañon possessed no church of any denomination. In spite of the absence of these signs of civilization, I have never known a community the members of which were better disposed or conducted. There was no theft, no violence, and hardly ever even an instance of drunkenness or a quarrel. Each worked steadily all the week, and, after a general wash-up on Sunday morning, it was the rule to adjourn to our general headquarters

at Jolntown, and spend the afternoon, and evening over a social game of cards."

The camp was on the eastern slope of the Sierra Nevadas, in what was then Utah, and is now Nevada.

It was the best type of the life that is depicted in its manifold phases and manifestations in the pages of Bret Harte, Mark Twain and Joaquin Miller. It was a wonderful experience and a valuable education for the youth of nineteen. But, adventures strange and perilous were still before him.

9.

Among the original forty-niners were two brothers, Allen and Hosea Grosh, of Pennsylvania. From California they had made their way over the Sierra to Gold Cañon in the early fifties. As early as 1854 they had discovered native silver in the cañon, which they revisited again and again, but they kept their knowledge to themselves. They were the first discoverers of silver west of the Rockies.¹ In the spring of 1857, after spending the winter in California, they were back again in the Cañon, and here young Bucke made their acquaintance, an acquaintance that ultimately involved him in the most terrible vicissitudes, and left him a legacy of life-long indescribable suffering. On the other hand, had the enterprise succeeded, he would in all probability have been reckoned among the McKays and Carnegies and Rockefellers; for the Groshes held the key to treasures beyond the dreams of Sindbad or Aladdin.

The ostensible object of the Groshes in 1857 was gold mining. Their real purpose was to explore for silver and ascertain the value of their previous discoveries. With a third partner, one George Brown, they made their own assays and "satisfied themselves that they had found and owned enormously rich silver lodes."

They located the best sites, took up as much land as the mining laws permitted, and were about ready to form a company to develop their extraordinary discoveries.

"The strange part of the story is that within three months from that time all three of these young and strong men met with violent deaths, and by an extraordinary combination of circumstances the papers relative to their discoveries, and which were naturally left in the hands of the last survivor, were absolutely lost."

Brown was murdered by a party of immigrants at his own door. Hoseo Grosh cut his foot with an axe, and died of blood-poisoning.

¹ There is a monument in their honour at Virginia City, to commemorate their achievement.

"Allen, overcome with grief, was left alone in the possession of their common secret."

The Grosh boys had been in the habit of spending each winter in California. Hosea's death delayed Allen's departure until winter was already closing in on the mountains.

It was now that Bucke came upon the scene. He had helped to nurse and bury the brother; and this led to a close friendship with Allen, who arranged that Bucke should take Hosea's place as his companion in the long journey over the mountains.

10.

It was the middle of November before they left the cañon. The donkey which carried their baggage strayed away, and it was the 20th before they left Washoe Valley. They had now but three days' provisions with them. In the valley the weather had been warm. Ascending the mountains they cut through six inches of ice the first night to get water. Next day, they crossed the eastern summit of the Sierra, about 9,000 feet high. Down 2,000 feet lower, to Lake Tahoe, and then on the following day, around the lake to its outlet through Trucksee river, they trudged on. The trail crossed the river and then Squaw Valley. Undeterred by twenty-four hours of rain, they attempted the western summit. The rain turned to snow, the trail was covered, was lost; the adventurers turned back to the valley, and, drying themselves as best they could in the still falling rain, lay down by their fire till morning.

Next day it was colder and snowing in the valley. They were obliged to encamp here for a week, the almost continuous snow hiding the trails and even the mountain summits. The donkey was killed for food. A tent was improvised of blankets. Its site served as a fireplace during the day and as their bed at night. The young men made themselves snowshoes, but these proved a failure and were thrown away.

On the 28th, the sky being bright and clear, they climbed all day to a high summit. "During a great part of the ascent the ground was too steep for walking. In such places our mode of procedure was to clear away the snow, catch hold of the bushes, and with hands and feet together climb up." Then they found a ravine, at least a thousand feet deep, with perpendicular walls, between them and the main ridge to be crossed. Again they went back to camp, reaching it about ten o'clock at night, tired out.

Finally, on the 29th, "after a terribly hard up-hill walk of some ten or twelve miles, through deep snow and over rough ground, we

gained the western summit about two o'clock in the afternoon." In the teeth of the intense cold and a bitter west wind, they crossed the three-mile plateau to the western edge. That night they camped down the slope in a forsaken cabin. Their matches had spoiled in Squaw Valley. They lighted their fire with a gun.

Two days of hard snowing followed. Again they made snowshoes, and again their efforts were doomed to failure, and the shoes were abandoned. Their meat failed. Four days of absolute starvation were before them. The trail now was a blazed one, and easily missed; the snow was three to four feet deep, and even more in places, along the side of a high ridge. Then the ridge spread into a broad plateau. Soon the trees failed them, there was no trail, and the cold was intense. Near sundown they came on fresh tracks, and hope sprang up in their hearts. Then they discerned the truth; they had wandered in a circle, and the tracks were their own. They were off the trail. It was snowing hard, obscuring objects a hundred yards distant. They tried to make a fire, but their gun failed them. It had got damp and refused to go off. Then they found that they were frost-bitten.

11.

The first necessity now was immediate shelter from the cold. Hope died in their hearts. The wealth of Golconda had no further charms or even interest. 'Skin for skin; yea, all that a man hath, will he give for his life.' The gun was thrown away. Allen's papers, containing the records of his discoveries and titles to claims, were abandoned. Others might reap where he had sown. Nothing was kept but the blankets, a tin cup and its contents, and a butcher's knife. In the tin cup was a miserable remnant of their meat.

They struck for the nearest edge of the ridge and down the steep slope, full speed through deep snow, to an evergreen valley. Here they placed their blankets on the ground, covered them a foot deep with snow, crept under the blankets feet first, and lay until morning. The warmth of their bodies thawed the snow, and they did not get dry again for several days.

On the 3rd December they followed down a ravine, hoping to find a river. A muddy current would indicate a mining camp up stream. The walking was through snow two and a half feet deep over very uneven ground. Sometimes they walked into low bushes they could not see. For two days longer they kept on their toilsome way down the ravine to the Middle Forks of the American river and still further down until it ran through a deep rocky cañon, where they were forced

to leave it, and walk over a ridge to and across another large stream. The travellers were famished and their strength was almost gone. The snow now did not average a foot deep. Brush was so weak, that Bucke walked in front to make the tracks for his feet. "Exhausted and despairing, I sat down, and, weeping, proposed to give up and lie down and die where we were." But Allen was determined to push through, and encouraged the despairing boy, reminding him of their friends in the East. When they camped at night, they were too weak to talk much. The younger hardly expected to live till morning, and thought that even if he survived the night, he would be unable to walk. "Let us make up our bed for the last time," he said to Allen, "for we shall never leave this place." But Allen still cheered him as best he could with the hope of reaching shelter somewhere yet. They slept but little.

Next morning, after "horrible and extravagant dreams we were barely able to crawl along, and went almost as much on our hands and knees as on our feet." The snow was now only a few inches deep. Once Allen said he heard a dog bark; Maurice refused to believe it. Then they came to a ditch with running water, and knew they were near a mining camp. In a few minutes Allan said, "There is smoke." They had walked or crawled just three-quarters of a mile that day.

The miners showed their proverbial generosity; but the exhausted youths could not eat. Next day they were unable to walk. In a few days they became delirious. On the twelfth day Allen Grosh died.

"No knowledge survived of the work of the Grosh brothers in Gold Cañon and its neighbourhood, except the bare fact that they had found silver. Two years afterwards in 1859, this knowledge, by making the miners watch for indications of silver, led to the finding of the Comstock lode, and that discovery to others, until the faint and soon almost extinguished spark of knowledge, struck from the rocks of Utah by the intelligence and perseverance of these two young men, resulted in the enormous silver-mining industry of western Nevada."¹

Maurice's powerful physique stood him in good stead under the trying ordeal he was called to pass through. He was obliged to lie in bed all winter. The miners sent down the mountains for a

¹ A letter, signed Duncan Gordon, published in the *New York Sun*, November 29, 1897, and entitled, "The Tragedy of the Comstock," was contradicted or varied in many of its statements by Dr. Bucke in an interview published in the *London (Ont.) Advertiser* of December 16, 1897. Gordon connected the Groshes and Dr Bucke more closely with the discovery of the Comstock than the facts, according to the latter, appeared to justify.

surgeon, "who found it necessary to amputate one of my feet, and a portion of the other." "For months," says one who knew him well, Dr. T. J. W. Burgess, superintendent of the Protestant Asylum for the Insane, Montreal, "the stricken man lay in that mountain cabin, tended only by rough, yet gentle, hands, and there it was that he first had time to think. 'I was born again,' he once said, in speaking of this period of his life, 'it cost me my feet — yet it was worth the price.'"¹ The stumps did not thoroughly heal for more than forty years. The sufferings he endured can be better imagined than described. But never was suffering more heroically borne, and uncomplaining, he suffered in silence.

12.

The youth of 16 returned to his Canadian home a man of 21, maimed and broken in health, but with a knowledge of nature and of men, a store of experience, such as few men of 21 have ever had. A sum of money left him by his mother enabled him to carry out a plan he had formed of going to college.

At once he entered upon a medical course at McGill University. He graduated in 1862, winning the prize for the best thesis of his year. The tremendous force of will, the dominance of the mental and moral powers over the physical system, which such a university career evinces, showed him to be no common man.

The prize thesis, entitled "The Correlation of the Vital and Physical Forces," defended before the Medical Faculty of McGill, May 2, 1862, was printed in the *British American Journal*, and in pamphlet form.

Among his fellow students at McGill may be mentioned Doctor Joseph M. Drake, afterwards professor of physiology at the university; Doctors Wright, of Ottawa, and Phillips, of Brantford.

His reading was not limited by the curriculum nor the books relating to medical science.

"Outside of his collegiate course he read with avidity many speculative books, such as the "Origin of Species," Tyndall's "Heat," and "Essays," Buckle's "History," "Essays and Reviews," and much poetry, especially such as seemed to him free and fearless. In this species of literature he soon preferred Shelley, and of his poems, "Adonais" and "Prometheus" were his favourites. His life for some years was one passionate note of interrogation, an unappeasable hunger

¹ From a paper read at the Annual Meeting of the American Medico-Psychological Association, held at Montreal, June 1902, and reprinted in pamphlet form from the published proceedings.

for enlightenment on the basic problems. Leaving college, he continued his search with the same ardour. Taught himself French, that he might read Auguste Comte, Hugo and Renan, and German, that he might read Goethe, especially "Faust."

13.

From McGill he proceeded to Europe for post-graduate work. The season of 1862-3 was spent in London. Dr. W. C. Vanbuskirk of St. Thomas was his fellow student with him in Paris, and from him some particulars relating to Bucke's student life, both there and in London, have been gleaned. He attended lectures in the operative theatre of University College, London. Fox, Jenner, Ringer, Erichsen, Quain, Harley, Hillier and Hare were among the lecturers. Most of the residue of 1863 was spent in Paris at the Hotel Dieu and the Hospital of the Collège des Médecins, where they attended clinics given by such men as Trousseau, Nelaton and Bouvier.

In Paris he was laid up for a time with a mild type of typhoid fever. He was able to continue his reading notwithstanding the illness, and Dr. Vanbuskirk remembers seeing him engaged in earnest perusal of Comte's works, whilst incapacitated by fever from attending the hospitals.

In London, a warm friendship sprang up between Dr. (afterwards Sir) Benjamin Ward Richardson and Bucke, growing out of mutual admiration and kept alive by intermittent correspondence. Bucke regarded Richardson as "the ablest man in the profession in England, and that is as much as to say, in the world." The results of their association would seem to be reflected in some of their publications, especially in those dealing with the therapeutic uses of alcohol.

On the return voyage by the St. Lawrence route he had an experience, which might have been attended with disastrous consequences. He occupied the post of ship surgeon, and in performance of his official duties was obliged to report at Grosse Isle some cases of contagious disease. This necessitated the quarantining of the steerage passengers, some of whom became infuriated at the doctor as the cause of their inconvenience and delay. An organized gang attempted to throw him into the river. With some difficulty Dr. Bucke was hurriedly lowered into one of the ship's boats and carried to a place of safety. He used to speak of this as one of the most exciting episodes in a life that was by no means devoid of thrilling incidents.¹

¹This incident was communicated by Dr Hugh A McCallum of London.

14.

Returning to Canada early in 1864, where his elder brother, Dr. Edward Horatio Bucke had died but a few months before, he settled down to the practice of his profession in Sarnia. But almost simultaneously, he was urgently requested to go to California in the interest of the Gould & Curry Silver Mining Company. It would appear that there was litigation with reference to mining claims in or near Gold Cañon, and it may be surmised that Maurice's knowledge of Grosh's discoveries was an important factor in the case. The year he spent on the Pacific slope was equivalent to a second post-graduate course in business and knowledge of men. He was amply remunerated for his time and services, and returned to Sarnia in 1865, not only enriched in experience, but with a substantial sum of money. Here he married, on the 7th September, Miss Jessie Maria Gurd. There were born to them eight children, of whom six survive, together with their mother. Settling down to the practice of his chosen profession, he met with success from the start, and had more than a local reputation. The Honorable Alexander Mackenzie was his first patient and frequently sounded his praises.¹ Sarnia was the home of the late Hon. Timothy Blair Pardee, M.P.P. for the county of Lambton from Confederation, and a distinguished Minister of the Crown for the Province of Ontario from the year 1872 until his decease in 1889. Mr. Pardee and Dr. Bucke recognized in each other congenial spirits, and became intimate friends. Their friendship had doubtless somewhat to do with the appointment of Dr. Bucke, in January, 1876, to the Superintendency of the Asylum for the Insane at Hamilton, on its first establishment. In the following February, on the death of Dr. Landor of the London Asylum, Dr. Bucke was promoted to the headship of the larger institution, a position he was to fill until his death. Had he lived a few days longer, he would have occupied this important post for a full quarter of a century. Only a few rods distant from the asylum lay the home of his childhood, the old Creek Farm, the scene of his earliest recollections.

It is not too much to say of him that as Superintendent of the London Asylum he did not fall behind the expectations which his university career and his professional reputation had led his friends to form respecting him.

To the literature of alienism he devoted his attention, with the same persistent determination that had carried him through the perils and labours of the earlier years. With the natural scientific bent

¹ This fact was mentioned by Dr. Bucke to Dr. Hugh A. McCallum.

of his mind, the practice and opportunities for observation and research afforded by his official position, and his continuous and close reading of reports and statistics, it was not long before he was recognized as an authority among alienists. His opinion was sought from far and wide. Medical and psychological societies were glad to give a conspicuous place to his name on their programmes and to his addresses and papers in their publications. His right to a place in the foremost rank of his profession in America was beyond question. In an appendix will be found a list of his printed pamphlets, lectures and addresses, of which particulars are accessible.

His annual reports to the provincial government are, with one exception, not specified in the list. The reports are all valuable. That for 1897 contains "The Story of the Care for the Insane in Ontario," an interesting and instructive historical *resumé* of the successive stages of progress in the treatment of this unfortunate class of citizens.

15.

In his chosen field he was not content to follow subserviently in the footsteps of his predecessors.

Cautious, but courageous, sure of his ground before taking the forward step, he signalized his administration of the London Asylum (the largest in the province) by three remarkable innovations, unheeding the opposition or the outcries of those whose conservatism did not approve of the modern spirit and changed methods.

(1) He was the first alienist in America to adopt the system of absolute non-restraint in the treatment of the insane.

(2) He discarded entirely the use of beer, wine or alcohol in any form at the asylum.

(3) He was the first, systematically, to employ gynæcological surgery in the treatment of insane women.

The first of these reforms could not be effected all at once. Public opinion had to be considered, and the experiment might involve dangerous consequences, not merely to the patient, but to the staff and attendants as well. For some years the degree of restraint was gradually diminished. "In the middle of 1883," writes Bucke in 1897, "we totally discontinued the use of restraint and seclusion in every form and have not used them since."

Dealing with this question, Dr. O'Reilly, Inspector of Asylums and Prisons, in his annual report for 1887, writes as follows: "To Dr. R. M. Bucke, Medical Superintendent of the London Asylum, belongs the honour of being the first to take up the subject practically in the

Canadian asylums. He approached it at first very properly with great hesitation and caution, but it only required a few weeks' practical study of the subject to convince him that all that had been said by the advocates of the system was well founded, and restraint in the London Asylum became a thing of the past. Dr. Bucke did not burn his restraint apparatus with religious ceremonies, nor make any flourish of trumpets about it. When the proper time came, he simply announced that after eighteen months' trial of absolute non-restraint in an asylum having a population of nine hundred patients he had found the system to be all that had been claimed for it, and that he was now unable to conceive of a case where mechanical restraint, except for surgical reasons, would be necessary; would not be, in fact, positively harmful to the patient. Dr. Bucke's example was slowly followed by others, until now in this province restraint appliances are unknown, and one after another the doctors give in their testimony to the great value of this reform, which was commenced by Connolly and Pinel half a century ago."

With the abolition of restraint may be said to have disappeared the last trace of the ancient method of treatment of the insane. The Bedlam of history is a thing of the past. Except for the protection of patients against themselves, the straight-waistcoat is no longer in use. Patients are treated as human beings. The law of love has been found effective with them as with the rest of humanity.

It is gratifying to be assured that the increased proportion of cures effected bears its due relation to the improvement in methods of treatment.

16.

It was a work of time to persuade the medical profession at large, that alcohol as a medicine was, as a rule, unnecessary and even positively injurious. The practice of eminent physicians such as Sir Benjamin Richardson and Sir William Gull in discountenancing its use in many cases was, no doubt, a strong factor in inducing Dr. Bucke to abandon it altogether. In his first or second year at London, he experimented by reducing the number of patients to whom beer, wine or whiskey was regularly served, and watching carefully the effect. In 1879 he closed the spirit rations entirely. The result warranted his action. "The health of the asylum was never better. I doubt if it was ever as good." The death rate was smaller; the percentage of recoveries higher.

So impressed was he with the importance of the results effected, that he brought the matter before the Dominion Medical Association

in a paper read at London, on the 10th September, 1879. The essay was printed in the London *Advertiser*, and reprinted twice in England. In the following year he enlarged and completed it for publication in pamphlet form, under the title "Alcohol in Health and Disease." He did not halt half way in his conclusions. He placed alcohol and blood-letting in the same category as obsolete in medical practice. "A time will come," he believes, "and that perhaps before many generations have passed away, when it will be as rare for a physician or surgeon to prescribe alcohol, as it is now for either of them to prescribe blood-letting, and when a healthy man will no more think of taking alcohol with a view of preserving his health, or to make him feel better, than he thinks now of going to a surgeon to be bled with a view to the same end."

17.

Among the reforms Dr. Bucke initiated at the London Asylum should be mentioned his adoption, experimentally, in 1888 of the "Intermittent Downward Filtration" system of sewage disposal. Col. Warring, of New York, was the engineer selected to inaugurate the new method. It proved efficient, economical, and in every way satisfactory. Dr. Bucke published the results far and wide through reports, addresses and printed papers, with a view to its general adoption by cities, towns and villages.

The sewage field, of about six acres, fertilized by the trenches into which the sewage was scattered day by day by a centrifugal pump, produced abundant crops, the average annual value of which was estimated by him in 1897 at \$250 an acre.

No wonder that his reputation not only as an alienist, but also as an administrator, grew with the years. The theorist and the practical man of affairs, the scientist and the business manager, were in him combined in a remarkable degree.

He was fortunate in having the hearty co-operation of a staff of able and loyal assistants. But the impression of his initiative, his energy, his mastery of detail, his enthusiastic interest in the institution, was felt in every part of its administration.

18.

Walt Whitman, who visited Bucke in 1880, described his management of the insane in the following terms:

"His method is peaceful, uncoercive, quiet, though always firm—rather persuasive than anything else. Bucke is without brag or bluster. It is beautiful to watch him at his work—to see how he can handle

difficult people with such an easy manner. Bucke is a man who enjoys being busy — likes to do things — is swift of execution — lucid, sure, decisive. Doctors are not in the main comfortable creatures to have around, but Bucke is helpful, confident, optimistic — has a way of buoying you up.”¹

On the establishment of a Medical Faculty in the Western University, in 1882, Dr. Bucke was appointed Professor of Mental and Nervous Diseases. His teaching we are assured was invariably satisfactory to both faculty and students.

In 1891 the Medical Faculty of McGill University paid him the high compliment of inviting him to deliver the opening lecture for the year. Its ability and forcefulness were the subject of wide comment and commendation.

Six years later, he was chosen President of the Psychological Section of the British Medical Association on the occasion of its meeting at Montreal. This was, perhaps, the most distinguished honour that could be bestowed upon a specialist in the branch of science to which he had devoted the best part of his life. It was followed in 1898 by his election to the Presidency of the American Medico-Psychological Association.

19.

The life of a physician in good practice in a small town is exacting in its demands, and leaves little time for literary culture. The more successful he is as a practitioner, the rarer necessarily are his opportunities for keeping up an adequate acquaintance with the great masters of the world of letters or with the current thought of the time. To do so presupposes the literary instinct and training. It calls for an intellectual equipment beyond the ordinary, careful economy of time, and great mental energy and resolution. Dr. Bucke was fortunate in possessing the instinct, the character and the training.

Reference has already been made to books read by him in his childhood and youth. As already stated, his bent for scientific and philosophical study manifested itself at an early age.

Buckle, Darwin and Tyndall he read while a medical student. In Paris he had become acquainted with Auguste Comte's "Cours de Philosophie Positive." Littré's books upon Comte and the writings of other positivists deepened the impression produced by the books mentioned. Herbert Spencer's works were perused with avidity. On the scientific and philosophical side, these, and especially Comte's works,

¹ "With Walt Whitman in Camden," by Horace Traubel. Boston, 1906, page 448.

were the formative influences in his earlier mental development. At a later period he became profoundly interested in Francis Bacon, whom he pronounced "incontestably the greatest intellect that the race has produced," adding, "His prose is the best in our language."

But matter-of-fact scientist as Bucke was by inclination and training, he had also the imaginative faculty developed in a high degree. Not only in the light, which prism could analyze, whose wave lengths and velocities could be computed, was he interested, but also in that other light that never was on sea or land," which defies analysis and calculation.

Shelley, "the poet's poet," was an early favourite. The charm of the *Adonais*, the *Prometheus* and the *Epipsychidion*, held him to the last. Tennyson and Browning were read with pleasure. Shakespeare's dramas he regarded as "probably the noblest expression of genius in any language—while his sonnets, to my mind, reach a spiritual level as high as has ever been attained by man—as high as that attained by St. John or by the author of the "Divine Lay,"—the 'Bagavad-Gita.'" The passage quoted shows that he had added to his stores of reading an acquaintance with the sacred books of the East, and been profoundly impressed with their poetic and spiritual content.

He possessed a memory for poetry which was the admiration and envy of his friends. He would repeat with profound appreciation and appropriate expression the whole of the *Adonais* or *Saul*, Tennyson's "Revenge," or sonnet after sonnet of Shakespeare, without book and without a mistake that the hearer could detect. "Leaves of Grass," from beginning to end, he seemed to know by heart.

Dr. Bucke learned German to read *Faust* in the original, "and found the poem worth the labour." This was followed by others of Goethe's works. Goethe was among "the writers who distinctly, though not markedly," influenced his mental evolution.

Dr. Bucke was not only an idealist, but a mystic, and the combination of these characteristics with literary culture and the scientific temperament and training forms an interesting psychological study. His literary product is the resultant of these forces, working upon an ardent and energetic nature.

20.

We now come to an event which Dr. Bucke regarded as pivotal in connection with what he deemed his most important life-work.

In 1867, Dr. Sterry Hunt, visiting Dr. Bucke at Sarnia, mentioned the name and quoted some verses of Walt Whitman. The effect on

the hearer was instantaneous and lasting. Henceforth his life was largely influenced by Whitman's personality and "Leaves of Grass." To this influence may be attributed practically the whole of his literary product.

In 1868 he procured a copy of W. M. Rossetti's *Selections*. In 1870, visiting Dr. Hunt in Montreal, he borrowed the latter's copy of the 1855 edition of the *Leaves*. In 1872 he obtained a copy of the new edition of 1871. All these volumes as well as Whitman's later publications in prose and verse he studied with eagerness.

It was during the early spring of 1872, while in England, that he passed through an experience known in the nomenclature of mysticism as illumination. "He and two friends had spent the evening reading Wordsworth, Shelley, Keats, Browning, and especially Whitman. They parted at midnight, and he had a long drive in a hansom (it was an English city). His mind deeply under the influence of the ideas, images and emotions called up by the reading and talk of the evening, was calm and peaceful. He was in a state of quiet, almost passive enjoyment. All at once, without warning of any kind, he found himself wrapped around as it were by a flame-coloured cloud. For an instant he thought of fire, some sudden conflagration in the great city, the next he knew that the light was within himself. Directly afterwards came upon him a sense of exultation, of immense joyousness, accompanied or immediately followed by an intellectual illumination quite impossible to describe. Into his brain streamed one momentary lightning-flash of the Brahmic-Splendour which has ever since lightened his life; upon his heart fell one drop of Brahmic Bliss, leaving thenceforward for always an after taste of heaven."

The effects were similar in some respects to those of "conversion." "Among other things he did not come to believe, he saw and knew that the Cosmos is not dead matter, but a living Presence, that the soul of man is immortal, that the universe is so built and ordered that without any peradventure all things work together for the good of each and all, that the foundation principle of the world is what we call love, and that the happiness of every one is in the long run absolutely certain. He claims that he learned more within the few seconds during which the illumination lasted than in previous months or even years of study, and that he learned much that no study could ever have taught."

21.

To this psychical experience may be traced, on Dr. Bucke's own authority, the theory elaborated by him in his book, "Man's Moral

Nature" (1879) as to the relation of the great sympathetic nerve to the moral nature. In it, he says, "he sought to embody the teaching of the illumination."

The subject appears to have been first broached by him in a paper on "The Functions of the Great Sympathetic Nervous System," read by him at St. Louis in May, 1877, and again in a paper on "The Moral Nature and the Great Sympathetic," read at Washington in May, 1878, before the Association of Medical Superintendents of American Institutions for the Insane.

In July, 1877, for the first time, he met and conversed with Walt Whitman. He called upon the poet at Camden. Of this meeting he gives a graphic account in the Introduction to "Calamus," a collection of Whitman letters to Peter Doyle, edited by Dr. Bucke, and published in 1897.

It is too long to transcribe here. But the effect is given in these words:

"Briefly, it would be nothing more than the simple truth to state that I was, by it, lifted to and set upon a higher plane of existence, upon which I have more or less continuously lived ever since—that is, for a period of eighteen years. And my feeling toward the man, Walt Whitman, from that day to the present has been, and is, that of the deepest affection and reverence. All this, no doubt, was supplemented and reinforced by other meetings, by correspondence and by readings, but equally certainly it derived its initial and essential vitality from that first, almost casual contact."

In a paper published in 1894, referring to the interview, he had written as follows: "A sort of spiritual intoxication set in which did not reach its culmination for some weeks, and which, after continuing some months, very gradually, in the course of the next few years faded out . . . it is certain that the hours spent that day with the poet was the turning point of my life. The upshot of it was the placing of my spiritual existence on a higher plane."

Readers of Lucian will remember his description of a somewhat similar effect produced upon him by the philosopher Nigrinus. Other instances in sacred and profane literature are by no means infrequent in cases of men and women of exceptional moral and spiritual elevation.

22.

"Man's Moral Nature" (1879) is dedicated "To the man who inspired it—to the man who of all men, past and present, that I have known has the most exalted moral nature—to Walt Whitman."

In this book he divides the moral nature into two classes of functions: positive, *i.e.*, love and faith; and negative, *i.e.*, hate and fear. He finds its physical basis in the great sympathetic nervous system. The moral nature is not a fixed quantity, but has developed from an initial stage, with hate and fear predominant, to that in which love and faith are more and more in evidence. The means by which the change has been effected have been (I) Natural Selection; (II) Sexual Selection; (III) Social Life; (IV) Art; (V) Religion. Infinite progress is the law. "Hate and fear are dying out. The argument is that their total extinction is justified. Faith and love are increasing. Infinite faith and love are justified. . . . the highest moral nature is nearest in accord with the truth of things. This is why we call those men inspired who have the most exalted moral natures, and those men wise who have exceptionally exalted moral natures as well as superior intellectual natures . . . religion, morality and happiness are three names for the same thing—moral elevation.

"This then is the end, the conclusion of the whole matter: Love all things—not because it is your duty to do so, but because all things are worthy of your love. Hate nothing. Fear nothing. Have absolute faith. Whoso will do this is wise; he is more than wise—he is happy."

It is hardly too much to say that this theory and these conclusions were the foundation and regulating principles of Dr. Bucke's conduct.

The facts and reasoning upon which his theory was based are for the scientist and the philosopher. The author's presentation is clear, full and interesting. His theory is put forward as a tentative one, as the one that seems most in conformity with the facts. The argument will appear more or less cogent according to the training and tendencies of him to whom it is submitted. The conclusion, however, according as it does with the highest and best in man, should meet with general acceptance. He was an optimist by instinct, by observation, by reflection, by a varied experience. Appropriately, he prefixes to the final chapter these lines from Whitman:

"The Lord advances and yet advances;
Always the shadow in front; always the reached hand, bringing
up the laggards."

After the first interview in 1877, Dr. Bucke made periodical visits to the Good Gray Poet. He took the field as his champion and expounder. Controversy as to the quality and tendency of "Leaves of

Grass" raged with more or less heat. Bucke rarely assumed the defensive. He was best in attack. His skill as a writer shows itself in exposition of his theme, in marshalling and massing his facts. Opposing facts are often left to take care of themselves. The result, as far as Whitman is concerned, seems to justify the strategy, if such it can be called. The last word has by no means been said, but, notwithstanding passages regarded by many as offensive to taste or to the critical ear, Whitman's place in the Pantheon is by this time assured. Criticism accepts "Leaves of Grass" as a whole, with reservation of judgment as to details.

In September, 1879, Bucke lectured on Whitman before an Ottawa audience. In May he wrote the *Philadelphia Press* a letter entitled, "The Good Gray Poet." This was an appellation first used by William D. O'Connor, in his brilliant defense of Whitman many years before.

The summer of 1880 was memorable for Whitman's visit to London as the guest of Dr. and Mrs. Bucke. He remained four months. During the summer, the two men made a voyage down the St. Lawrence as far as the Saguenay and up the latter stream to Chicoutimi and Ha Ha Bay. Whitman was greatly impressed with the Asylum, its "ample and charming gardens and lawns," the religious services, the demeanour of "the motley, yet perfectly well-behaved and orderly congregation," the "Refractory Building," then under special charge of Dr. Beemer. Referring to the whole institution, he wrote in his diary: "As far as I could see, this is among the most advanced, perfected, and kindly and rationally carried on, of all its kind in America. It is a town in itself, with many buildings, and a thousand inhabitants."

The four months thus spent with Whitman were important in results. Bucke was resolved to write a biography of the poet. The latter demurred, objected, was at length overruled, gave consent, and, indeed, actively co-operated. Bucke put himself in communication with all whom he thought possessed of information required by him, including leading writers in Europe and America. The results were a collection of correspondence unique and valuable, and friendly visits received and returned.

With Whitman he went to Long Island in 1881 to familiarize himself with the former's early home and its environment. In working the book into shape valuable aid was rendered by William D. O'Connor, Mrs. Ann Gilchrist and others, who contributed facts, illustrative material and incidents.

Although the book was ready in 1881, publication was delayed owing to difficulty in securing a satisfactory publisher. After various

suggestions had been made, Osgood of Boston, would appear to have been his original choice. But Osgood was not in the humour. He had just then been forced by threats of prosecution by the Attorney-General of Massachusetts to withdraw from sale his edition of "Leaves of Grass." Early in May, 1882, Bucke wrote O'Connor that Osgood had declined "Walt Whitman, a Study." O'Connor wrote another scathing letter to the press, defending the "Leaves." On the 3rd June, he wrote Whitman that Bucke had written him "quite jubilant over my letter, and telling me the fix I have got his book into, which is comic as a scene from Molière. You will see the fun, when you know that he had sent his MS. to Osgood ! !"

Whitman, as has been stated, took an active interest in the "Life." His extended and varied experience, as compositor, editor, proof-reader, business manager, was at Bucke's disposal, and was invaluable. It was Whitman who arranged with Gutekunst for proofs of portraits of his father and mother, the number of copies to be printed and the price. The first twenty-four pages were written by him.

He suggested names of publishers, and finally, when Osgood declined the book, it was Whitman who, on 19th February, 1883, with his own hand drew up the agreement between Dr. Bucke and David McKay of Philadelphia, for the publication of "Walt Whitman, a Contemporaneous Study." The agreement shows Whitman's business ability and carefulness in looking after details, and is witnessed by him.

24.

It was under the title, "Walt Whitman the Man," that the volume at last appeared from the press of David McKay.

In the following year, the Glasgow edition appeared with an addition entitled, "English Critics on Walt Whitman," edited by Edward Dowden, LL.D., Professor of English Literature in the University of Dublin.

"The book is valuable," says Ernest Rhys in his introduction to the volume of Selections from Walt Whitman in the *Canterbury Poets*, "not only as an authoritative biography—the standard biography—but for its collection of contemporary notices and criticisms, European and American, favourable and the reverse, of 'Leaves of Grass.'" "In the English list the names of Ruskin, Tennyson, Swinburne, Buchanan, Symonds, and other leading poets and writers bear unique testimony to Whitman's influence."

In the Introduction, Dr. Bucke asserts that the basic meaning and value to us of the man, Walt Whitman, and the book *Leaves of*

Grass, is *moral elevation*. "The true introduction, therefore, to this volume is the author's previous work, "Man's Moral Nature." In that book he has discussed the moral nature in the abstract, pointed out its physical basis, and shown its historical development; while the sole object of the present work is to depict an individual moral nature, perhaps the highest that has yet appeared."

25.

"Man's Moral Nature," had given Dr. Bucke a status not only as an original investigator and independent thinker, but as a writer of talent. It was with general acquiescence therefore that, on the establishment of the Royal Society of Canada in April, 1882, he was honoured with selection as one of the original Fellows.

"Walt Whitman the Man" brought him into closer touch with men of eminence on both sides of the Atlantic. As Whitman's intimate friend, authoritative biographer, and redoubtable champion, he was now become a personage in the literary world.

Among notable literary men and women whose acquaintance he made and with most of whom he corresponded more or less, may be here mentioned the following: in France, Gabriel Sarrazin; in Denmark, Rudolph Schmidt; in the British Islands, Professors Edward Dowden of Dublin, and York Powell of Oxford, John Addington Symonds, William Sharpe, Ann Gilchrist, Herbert H. Gilchrist, H. Buxton Forman, Edward Carpenter; in the United States, John Burroughs, William D. O'Connor, Oliver Wendell Holmes, Horace L. Traubel, Robert G. Ingersoll, E. C. Stedman, Thomas B. Harned, Minot J. Savage, Sidney Morse the sculptor, Thomas Eakins the painter, William Sloan Kennedy, Isaac Hull Platt, Oscar Triggs, Daniel G. Brinton, Henry Howard Furness, Talcott Williams, Francis Howard Williams, Hamlin Garland, Charles G. Garrison, Laurens Maynard, Mary A. Livermore, Professor William James. Browning and Tennyson he met in England.

Lord Tennyson and Walt Whitman carried on a friendly and even affectionate correspondence for twenty years, until it was terminated by death. A letter of introduction from the American poet was a sufficient passport to the hospitality of Farringford, where Bucke spent a delightful afternoon and evening with the Tennysons in the summer of 1891.

Visitors of note found their way to London, from time to time, to enjoy the friendly hospitality of Dr. and Mrs. Bucke. Among these may be specially mentioned Edward Carpenter, who spent some weeks with them in the summer of 1884.

26.

Dr. Bucke paid many visits to Whitman at Camden. During one of these visits, in June, 1888, Whitman was seized with a serious illness which threatened a fatal termination. Dr. Bucke became his general medical adviser, and at once placed Dr. William Osler in charge. Early in 1892, when the old poet's time for departure was at hand, Bucke was again at his bedside, although unable to remain until the end. At the funeral, which was a memorable expression of popular appreciation and sympathy, the doctor was an honorary pall-bearer. He was one of the speakers at the grave. By the poet's will, Richard Maurice Bucke, Thomas B. Harned and Horace L. Traubel were appointed his literary executors.

The volume entitled "In Re. Walt Whitman," published by the executors in 1893, contains among its many papers articles from Dr. Bucke's pen.

A large part of Whitman's correspondence, MSS. and other papers, came into his hands, and he devoted himself assiduously to their assortment and to editing portions from time to time, as his other duties permitted.

The books issued by Bucke under the titles, "Calamus" (1897), and "The Wound-dresser" (1898), are composed of Whitman's letters to Peter Doyle and the poet's mother respectively. "Notes and Fragments," of which 225 copies were issued for private circulation in 1899, is made up of Whitman's notes and memoranda, showing the evolution of "Leaves of Grass," almost from the germ.

The Introductions by Dr. Bucke to these three volumes are full of interest, and of autobiographical as well as biographical value.

Dr. Bucke's collection of portraits of Whitman is the most complete in existence. His collection of books, pamphlets, MSS., and bibliographical data relating to the sage of Camden is also probably unsurpassed.

In Horace Traubel's book, "With Walt Whitman in Camden," are many references to Dr. Bucke, jotted down by Traubel, from Whitman's table-talk in 1888. They are interesting as indicating Whitman's estimate of Bucke's qualities and friendship.

Referring to Sloane Kennedy, as one of his most ardent admirers, Whitman added, "Indeed, he out-Buckes Bucke."

On another occasion, Bucke's name being mentioned, he exclaimed: "Bucke? O, yes, Bucke! Some one was here the other day and complained that the Doctor was extreme. I suppose he is extreme — the sun's extreme, too; and as for me, ain't I extreme?"

Ernest Rhys having "seen Dr. Bucke and Niagara," Whitman expressed pleasure, saying, smilingly, "I am proud of both."

Speaking of his serious illness in June, 1888, Whitman said Bucke saved his life, "his skill, decision, brotherliness, pulled me ashore." And again, "Osler, too, has his points, big points. But after all the real man is Dr. Bucke. He is the top of the heap. He has such a clear head, such a fund of common sense—such steady eyes—such a steady hand. As you say, Bucke is a scientist, not a doctor; he has had severe personal experiences—is an expert in questions involving the mind—is in every sort of way a large man—liberal, devoted, far-seeing. I especially owe him so much,—Oh, so much."

A short note from Bucke, he described as "a whiff of fresh air from the north." In sending a return message, he added: "Doctor is the kingpin." One day there was no letter from Bucke: "I get to look for Bucke as I look for my breakfast," he said.

27.

In May, 1894, Dr. Bucke read before the American Medico-Psychological Association in Philadelphia, a paper entitled, "Cosmic Consciousness." The thought had been long in his mind. The germinal idea is traceable in his two earlier books, "Man's Moral Nature," and "Walt Whitman the Man."

In August, 1897, as president of the Psychological Section of the British Medical Association at Montreal, he further developed the thought in his presidential address on "Mental Evolution in Man."

Four years later the result of his researches on the subject was put before the world in a book entitled "Cosmic Consciousness; a Study in the Evolution of the Human Mind," of which a limited edition of 500 copies was printed from the type by Innes & Co., of Philadelphia, in 1901. As a specimen of the book-maker's art it is worthy of note. Its dignified format, quarto, on a specially good quality of paper, with wide margins and large clear-cut type, is an evidence of conscientious purpose and execution, which is somewhat rare in the age we live in.

The term "cosmic consciousness" is derived from the east, signifying an elevated plane of consciousness associated with various psychic phenomena, including that known as "illumination." The author finds it exemplified in fourteen conspicuous instances, including the founders of the three great religions, and in eleven other persons, viz.: Plotinus, Dante, Las Casas, John Yepes, Francis Bacon, Jacob Behmen, William Blake, Honoré de Balzac, Walt Whitman and Edward

Carpenter. He adds thirty-five cases, "some of them lesser, imperfect and doubtful instances." These include Moses, Gideon, Isaiah, Socrates, Pascal, Spinoza, Swedenborg, Wordsworth, Finney, Pushkin, Emerson, Tennyson, Thoreau, Bucke himself and many more. Collecting and comparing their recorded experiences, he finds sufficient data for a general induction. There are, he thinks, perceptible in the history of human consciousness, three distinct stages of evolution, simple consciousness, self consciousness and cosmic consciousness. "The prime characteristic of cosmic consciousness is, as its name implies, a consciousness of the cosmos, that is, of the life and order of the universe." With it occur, among other phenomena, an intellectual enlightenment or illumination, moral exaltation and a quickening of the moral sense, and withal "a sense of immortality, a consciousness of eternal life, not a conviction that he shall have this, but the consciousness that he has it already." This position he supports by quoting in each case the words of the original records.

The theory is that this higher form of consciousness is at present making its appearance in the human race, that the comparatively few cases cited are forerunners of a time, when by regular and orderly evolution the whole human race will reach the higher plane, along which it will proceed on its path of further infinite development.

This conclusion is based upon the fact, which he considers established by the records, that there is a progressive increase throughout human history since the earliest recorded instances in the number of persons who have attained to cosmic consciousness.

Another physician, who was also a philosopher, Dr. Oliver Wendell Holmes, hints at such a conclusion, in a remarkable passage in the "Professor at the Breakfast Table."

"I think of it," he says, referring to a similar intuition in his own experience and that of others, "as a disclosure of certain relations of our personal being to time and space, to other intelligences, to the procession of events, and to their First Great Cause . . . I am disposed to consider our beliefs about such a possible disclosure rather as a kind of premonition of an enlargement of our faculties in some future state than as an expectation to be fulfilled for most of us in this life. Persons, however, have fallen into trances—as did the Reverend William Tennant, among many others—and learned some things which they could not tell in our human words."

Conversion, the "inner light," illumination, mysticism, transcendentalism, are psychological facts pertaining to religion in its higher manifestations. In "Cosmic Consciousness" they are subjected by a

scientist, who was at the same time a philosopher and a mystic, to scientific collation and comparison, and to the inductive process of reasoning.

As a compilation of recorded cases, aside altogether from the theory based upon them, the book possesses a distinct value and is of remarkable interest.

The theory itself is attractive. Whether it is borne out by the facts cited, the reader must decide for himself. It is at any rate suggestive. As a contribution to the literature of the subject, it occupies a unique place. The ultimate conclusions, if a consensus should be arrived at, will be of inestimable moment to the human race. Among other results will be, perhaps, a final reconciliation of the long struggle between science and religion.

28.

In the mountains of Montana, more than a year before the book went to press, the author's eldest son, Maurice, had been thrown from his vehicle in a runaway accident, dashed against a rock, and instantly killed. He was thirty-one years of age, but had already reached eminence in his profession, that of a mining engineer. A British Columbia paper described him as "a man of exceptional attainments, genial, courteous, pure and thoroughly incorruptible." To the dead son, the volume is dedicated. There are few more pathetic words in all literature. Few sons ever had so noble an epitaph. But the bitter pain is not the last word. The confident assurance of speedy reunion sustains and consoles. Then the great mystery of death, sorrow and suffering, will be solved. "We shall clearly see that all were parts of an infinite plan, which was wholly wise and good." Those who would know the intensity of the religious sentiment which dominated the soul of Richard Maurice Bucke will read the tender and beautiful words of the dedication with admiration as well as sympathy.

According to Bucke, cosmic consciousness is a nascent faculty, showing itself principally in exalted human personalities, with exceptional development of all the ordinary human faculties, with exceptional physique, beauty of build and carriage, exceptionally handsome features, exceptional health, exceptional sweetness of temper, exceptional magnetism, and exceptional moral nature.

An interesting feature of the book is the manner in which the author's expert knowledge of alienism is brought in to illustrate the development and devolution of function. Devolution being most active in the latest forms, insanity and genius develop side by side in increas-

ing ratio, as the natural concomitant of the rapid evolution of mind, which distinguishes the Aryan race. It is the price we pay for progress. The possessors of the newer consciousness are not insane. This is shown by an examination of the distinguishing characteristics of insanity. His treatment of the subject is always frank, sincere and reverent.

The entire edition of "Cosmic Consciousness" was sold within a short time. One of the most eminent authorities, Professor William James, wrote Dr. Bucke an appreciative letter from which the following extracts will be of interest:

"I believe that you have brought this kind of consciousness 'home' to the attention of students of human nature in a way so definite and unescapable that it will be impossible henceforward to overlook it, or ignore it, or pooh-pooh it entirely away. For psychology and religion, that seems to me a very high service indeed But my total re-action on your book, my dear Sir, is that it is an addition to psychology of first rate importance, and that you are a benefactor of us all."

29.

Dr. Bucke, like his friend William D. O'Connor, was a strong Baconian in the never-ending Shakespeare controversy, and wrote letters and articles on the subject to newspapers and magazines, in 1896 and subsequently. In the fall of 1897 this involved him in a brief controversy with Mr. Goldwin Smith, begun in the *Canadian Magazine* and concluded by Dr. Bucke in the columns of the *Toronto Globe*. At the time of his death he had a volume ready for the press dealing with a new cypher he claimed to have discovered.

30.

Death came suddenly to Dr. Bucke on the 19th February, 1902. He and Mrs. Bucke had dined and spent the evening with friends in the city. After dinner, the gentlemen of the party, four in number, all of them university men, discussed the question of the cyphers and the Baconian authorship, with special reference to the Doctor's discovery of a new cypher. His book was ready for publication, and was to appear in June, when the particulars would be disclosed. The general question was debated with friendly freedom. The Doctor, in his customary buoyant spirits, was at his best. Argument, illustration, apt quotation, treasures new and old from the wonderful stores of his memory, were presented to listeners, who admired whether they agreed with his conclusions or not.

The party rejoined the ladies for a brief moment before the cutter called to take him and Mrs. Bucke to their home east of the city. Addressing one from a neighbouring city, he asked particularly about her six children, naming each in turn. He had last seen them at their home five years before. Surprise was expressed at the minuteness of his recollection, as he desired to be remembered to the young people. But it was characteristic of the man to be specially interested in children, and he did not easily forget them. In a few courteous words he took leave of host and hostess, and of the other guests.

The night was intensely cold, the sky clear, the moon nearly at its full, the stars shining with the steely glitter of a Canadian night in February, the snow crisp under foot. Going out into the night, he stopped to exclaim in admiration of the beauty of the sky. Driving home, he spoke of the pleasure the evening had given him, and warmly of the friends he had met. In a few minutes he was at home, but could not resist the desire to go out once more to look at the night and the stars. On the verandah, he dropped lifeless to the floor. And so, in the prime of vigour, while the eye was not dimmed, nor his natural force abated, he "fell on death," and was reunited to the son, who had gone before.

31.

His decease called forth many expressions of appreciation and of sorrow.

The London *Free Press*, in referring to his death, gave an interesting description of his appearance, which is worth reproducing:

"The Asylum Superintendent was a familiar figure down town. He was known, at least by sight, to nearly everyone. His personage was so markedly picturesque as to attract attention. The kindly face, full of strong character, the flowing beard, streaked with gray and white, the very build of the well-proportioned, well-preserved man of sixty odd years, was certain to bring notice. Those who knew Dr. Bucke were proud of the fact. To know was to admire and esteem."

Dr. T. J. W. Burgess, in the paper already cited, adds: "In appearance Dr. Bucke was one of the most picturesque personalities in the ranks of the American Medico-Psychological Association. His commanding presence, his massive head, his keen, searching eyes and prominent nose, his face, every line of which carried the stamp of intellectual force, his flowing beard covering the *négligée* woollen shirt, his silvery locks showing below the broad-brimmed, gray, slouch hat, and his gray tweeds, made him a strikingly conspicuous and original figure. His manner was plain but dignified, his language clear, and

in speaking he attracted the attention of his hearers no less by the matter of his remarks than by his personal appearance.

"During his asylum career, Dr. Bucke evinced wonderful ability in the management of the insane, his constant endeavour being to care for the interests confided by the Province to his charge intelligently, faithfully and economically. As an administrator he had few superiors, and those who knew him will ever bear witness to his singularly clear judgment in all relating to hospital affairs. He had long been regarded as one of the leading authorities on the subject of mental disease, and his services as an expert were sought in most important cases where sanity was in question. In these his wide knowledge of medicine and of human nature always showed to advantage, his opinions always commanding the attention and respect alike of judge and jury."
 "Sadly shall we miss the sight of his picturesque, Whitmanic garb, and face full of strong character, the sound of his bluff, cheery voice, and the hearty grasp of his hand — and not one of us but will fervently echo the wish— 'O, for the touch of a vanished hand, and the sound of a voice that is still.'"

"By his demise Canada has lost one of her foremost minds, this Association one of its most valued members, and, saddest of all, his family a devoted husband and father. Peace to his ashes." "He rests from his labours, and his works do follow him."

In a paper published in the *American Journal of Insanity*, Dr. Burgess adds: "It is impossible to judge him by ordinary standards, so great a part did individuality play in his make-up Whatever this remarkable man did, he did with his whole soul, and no one ever dreamed of attacking his sincerity of purpose, no matter how violently they differed from his conclusions In daily life he was simple, direct and honest, and loved nature as such a man is likely to do. The happiest days of each year were those spent at his summer retreat at Gloucester Pool in Muskoka."

32.

Traubel mentions a conversation with Whitman, in which the latter described Bucke's optimism in the following words:

"Bucke has an immense faith in the people at large — immense — in civilization, in modern mechanical devices — miracles of power." "Do you say," asked Traubel, "that Bucke has more faith in the people than you have?" "I think he has," was the reply, "Bucke is an optimist — thoroughly so, without qualification or compromise — so are you — but I could hardly call myself that in the strictest sense of the word."

An optimist he was in the fullest sense of the word. He radiated peace and happiness. He made many friends and kept them. Whether at home in the beautiful grounds surrounding the great institution, which he administered with such signal success, or at "Liberty Hall," his summer island-residence in Gloucester Pool, his domestic life was ideal in its simplicity, its sincerity, its atmosphere of affection, ease and joyous freedom.

"He was a man, take him for all in all
"We shall not look upon his like again."

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III.—*Fleury Mesplet, The First Printer at Montreal.*

By R. W. McLACHLAN.

Honorary Curator of the Numismatic and Antiquarian Society of Montreal.

(Communicated by Dr. S. E. Dawson, and read May 23, 1906.)

PREFACE.

When I commenced this memoir of Montreal's first printer it was simply to give such a short sketch as I had deducted from a few documents that, I may state, almost accidentally came into my hands. But, after having started, fresh documents were unearthed; each of which shed some new light, not only on the subject in hand, but on the history of Canada. I have, therefore, thought well to reproduce the whole herewith as well as the titles in full of all books and other publications printed by Mesplet, as far as they can be authenticated by existing examples in inventories, in advertisements or elsewhere.

I would express my indebtedness and thanks to those who so kindly replied to my inquiries and otherwise helped in this memoir. To Judge L. W. Sicotte I am more especially indebted for access to his almost unique library of rare Canadiana and for transcriptions of the imprints in the library of the late Mr. Justice Baby. To Messrs. E. Z. Massicotte, and Charles Adélarde Gareau of Montreal for timely help in securing manuscripts otherwise unknown to me. To Abbé Camille Roy of Université Laval, Quebec, for the titles of some twelve Mesplet imprints in the University library as well as most helpful comments in respect to these publications. To Mr. Cyrille Tessier a bibliophile of some importance for the titles of two unique factums. To Messrs. L. P. Sylvain of the Library of Parliament, and Benjamin Sulte of Ottawa, for kindly advice and pointers regarding books. To Dr. A. G. Doughty, Canadian Archivist, for transcriptions of documents, and to Messrs. Herbert Putnam, Librarian of Congress; Ruben G. Thwaites, Secretary of the Historical Society of Wisconsin, and more especially to J. W. Jordan, Librarian of the Historical Society of Pennsylvania, for transcriptions and photographs of Mesplet's imprints not to be found elsewhere.

I trust that this work may prove helpful to collectors of Canadian books and students of Canadian history.

FLEURY MESPLET, THE FIRST PRINTER AT MONTREAL.

Printing, it may be claimed, was introduced into Canada in three well defined instalments; all truly original, catering, as they did, for widely divergent classes as well as sections of the country. Each in its own way is a record making epoch, as it marked the beginning of—aye, rather introduced the means of awakening—literary instincts amongst those of different thoughts and aspirations.

The first of these dates back to 1751, when Bartholomew Green, son of the man who printed the first American newspaper, came from Boston and set up a press in Halifax, the newly founded capital of Nova Scotia. He died a few months after his arrival, but his place was taken by John Burshell who, in March, 1752, commenced the *Halifax Gazette*, the first Canadian newspaper.

The second of these epochs was introduced by the firm of Brown & Gilmore, which came from Philadelphia in 1764, and opened up an establishment in Quebec, to print the *Quebec Gazette* and other official matter for the government organized under British auspices. As this publication set out more especially to supply the English element and British interests, although printed in both languages, the French being mainly translations, the whole tone was English in idiom and thought.

The third introduction, notwithstanding having come twenty-five years later than the first, was even more important for ever since, nay, even some years before they came under British rule, the “new subjects,” as they were then called, had been altogether isolated from *La Mère patrie*. In the meantime, having been accorded a greater measure of liberty than they had hitherto enjoyed, they began to develop in a different direction. Thus the two French-speaking peoples grew wider and wider apart so that, after sixteen years of this separation, the Canadian section was found without an indigenous literature—it never had a press of its own—voicing its own thoughts and aspirations, or the means of developing and recording such tendencies. Thus it was, that, when Mesplet came to Montreal and set up his press, although under the auspices of the high priest of their erstwhile enemies—the hated Bastonnais—he, as one speaking their own language and one who could reproduce in print their own sentiments, was welcomed by the people with open arms.

Although very little has been recorded of Mesplet's early history, yet, having come across a number of documents bearing on his sojourn in Canada and the difficulties with which he had to contend as a pioneer printer out of sympathy with the government, I reproduce them here

with such conclusions and chronological sequences as I have been able to deduce therefrom.

Fleury Mesplet was born in the Parish of St. Nizier, diocese of Lyon, in France, about the year 1735. His father's name was Jean Baptiste Mesplet, and his mother's Marie Antoinette Capeau. There are four parishes of St. Nizier in the diocese of Lyon, one in the city and three in the country. The latter are known by sub-names, as St. Nizier d'Azergues, St. Nizier de Formas, and St. Nizier sous Charlier. As none of these sub-titles are mentioned, we may conclude that Mesplet's birthplace was in the City of Lyon, where he received a good (common school) education sufficient to fit him for his chosen trade; that afterwards he was apprenticed to that trade, and that in due course he became a capable printer.

As Mesplet did not marry until he began to be about thirty years of age, we may conclude that, it was during his bachelor days, while meeting in secret with others of his own craft, he became saturated with the republican ideas that then prevailed in France; which ideas were believed to be a cure-all for the distress caused by misgovernment. As the church was intimately connected with, or rather formed part of the government, it became involved in the same condemnation; therefore Mesplet, following the lead of his companions, became not only a republican, but an open free thinker; which belief, or rather unbelief clung to him for many years afterwards.

It was, at least, as late as 1765, that he married Marie Mirabeau, then a girl of eighteen, who, although twelve years his junior, proved a good and faithful wife during his wanderings and under his many vicissitudes of fortune. From this union there does not appear to have sprung any children, as none are referred to in his later history.

Some eight years after his marriage his dissatisfaction with the political and commercial outlook in France led him to seek success elsewhere; whether before this he had launched out as a master printer it is so far not known. In any case the incapacity of the government of Louis XVI was such, and the taxation imposed had become so oppressive and repressive as to bring France to the verge of bankruptcy and make it almost impossible for an honest workman to earn a living. Mesplet determined therefore to migrate. Avoiding the French colonies, in which he feared that similar oppression and repression prevailed, he struck out for London and landed there not later than early in 1773, where he set up his press at an address near Covent Garden. From this press was issued "*La Louisiane ensanglantée*," a book of about 200 pages, written by¹ Chevalier de Champigny. This is the

¹ See appendix A, No. 1.

first of his known imprints and the only one extant emanating from London.

As a stranger speaking a foreign tongue he did not secure a remunerative patronage in London, so, together with others of his self-exiled compatriots, attracted by Franklin's championship of the cause of the American Colonies, and his republican and free-thought sentiments, he sought an interview with the American statesman, to inquire regarding the prospects of success and the enjoyment of liberty in America, and was advised to try Philadelphia. Franklin, the real leader of the revolt of the thirteen colonies, at once became convinced of the advantage of securing the services of a French printer, in sympathy with the revolutionary movement, ready, when occasion required, to send into the Province of Quebec to influence its people by press and precept, although alien in race and language, to cast in their lot with this movement, and thus, by extinguishing British rule in America, make the new order a continental congress indeed.

Fortified with a letter from Franklin to Congress, Mesplet, towards the close of 1773, or the beginning of 1774, set sail for Philadelphia with his wife and his printing outfit. There he settled down to business and rented a house belonging to Anthony Benezet¹ at \$112 per annum. He formed a partnership with someone who evidently furnished the necessary capital, but whose name is not recorded, and set up as a master printer. It is not clear whether he hired space for his type and press and used the same printing office as Miller,² or had his press-work done there, for Berger writes that his type was at this printer's, and that he had paid him \$176 (due either for space or press-work).³

Through the letter of introduction from Franklin he was commissioned by the Continental Congress in 1774, to print a sixteen page pamphlet, addressed "*Aux Habitants de la province de Québec.*"⁴ Whatever other orders he may have received from Congress or from the citizens of Philadelphia during that year they did not appear to

¹ He was a son of Etienne Benezet who came from France early in the 18th century and carried on a successful business in Philadelphia. Anthony was a strong abolitionist and published a number of works against negro slavery. He befriended printers, especially those from his native country.

² The Miller here referred to (Heinrich Mueller) held towards the German population of Philadelphia of which there was a considerable number, a somewhat similar position as did Mesplet to the French. Their interests were therefore not likely to clash even though they occupied the same building. One of Miller's imprints is shown on a book described in the "*Bibliography of the Algonquin Languages.*" J. C. Pilling, Washington, 1891, page 544. When Philadelphia was captured in 1777, Miller hid his presses but they were discovered and carried to New York and were used for printing British Proclamations.

³ See appendix C No. 1.

⁴ See appendix A No. 2.

be sufficient for his encouragement. No doubt the old English, as well as colonial, antipathy for the French remained and so stood in his way that he was unable to secure a remunerative run of customers. Therefore, early in 1775, perhaps in January, but in any case not later than February, he started hurriedly on a prospecting journey to Quebec, leaving his wife behind and his affairs in Philadelphia in a most unsatisfactory state. Through exposure to the cold during the tedious winter's journey he fell sick which, together with his embarrassed financial condition and the suspicion with which he, as a Frenchman, was looked upon by the British authorities, caused him much pain and uneasiness.

On the 29th of March Charles Berger wrote from Philadelphia a most friendly letter¹ expressing the greatest interest in his welfare, while at the same time upbraiding him for not at least saying good-bye before leaving, and also for not having settled with his former partner. He had found it necessary to secure the type at Miller's by paying the amount due him, and to secrete it, together with his other effects; so that they should be safe from threatened seizure by the partner. Berger also paid a quarter's rent due by Mesplet which, with the amount paid to Miller and other debts, came to a total of \$350. In this letter he expressed a hope that Mesplet might be able to make arrangements with some one at Quebec to supply sufficient capital to set up a successful printing office there, promising in a most friendly spirit, to forward his printing plant as well as his wife to Quebec, or to honour his draft for funds necessary for his return trip. Further, he asked Mesplet to learn all he could regarding the sentiments of the Canadians towards the separation movement from Great Britain, for which, as the letter claims, his superior intelligence rendered him well fitted. It will thus be seen that Mesplet had deeper ends in view than setting up a press in Quebec.

It seems he was not successful in his efforts to find a capitalist ready to set him up, and no doubt found the people either ignorant of or indifferent to the benefits set forth in the republican propaganda to the south. In any case he did not remain long in Quebec, for he had again started printing in Philadelphia before the close of 1775,² as it would have been difficult for him to get through the lines after the breaking out of hostilities, we may conclude that he had reached Philadelphia not later than June or July.

¹ See appendix C No. 1.

² See appendix A Nos. 3-6.

Now, did Mesplet print a book when at Quebec in 1775, as is claimed by Gagnon.¹ This seems altogether impossible, for the very good reason that Mesplet's stay in Quebec was not sufficiently prolonged to undertake any extensive work, and then he had no type or press with him. The incorrect attribution by Gagnon of the book, "*Cantiques de Marseille*," dated 1776 at Quebec² to the year 1775—of which more later on—will account for the error.

As Mesplet had to pass through Montreal on his way to and from Quebec he had an opportunity of seeing and learning something of the place that was to be the arena of his future labours as a printer. There most likely he secured an order from the Seminary of Montreal for the first edition of "*Règlement de la Confrérie de l'adoration perpétuelle*,"³ which order he executed on his return to Philadelphia; but, fearing complications, suppressed his imprint. The "*Nouvelle édition, revue, corrigée et augmentée*,"⁴ has long been classed as the first book printed in Montreal, although some collectors are inclined to pass back the honour to the first edition; but it seems hardly possible that two editions of a book of this kind could have been printed within the short space of six months. Then they seem to have been set up from different fonts of type, for the first edition contains a number of varieties of ornamental dividing lines, all differing from the single variety that occurs in the second edition. The only other alternative is that this first edition was printed at Quebec, or France as is claimed by Dionne.⁵ But neither of these alternatives seems probable; the first because there would be no reason for suppressing the imprint, and in the second, because the importation of books from France was prohibited.

Shortly after he had resumed operations in Philadelphia he entered into partnership with his friend, C. Berger. One publication bears his own imprint alone,⁶ two are without imprints;⁷ one of these having been printed by an "*Imprimeur Ambulant*," while the "*Règlement Militaire*,"⁸ for which, by resolution of Congress, dated 23rd of February, 1776, he was paid \$44,⁹ was in his first work in partnership with Berger. This partnership continued until September, 1778, when the name C. Berger disappears from the imprints.

¹ *Essai de Bibliographie Canadienne*, P. Gagnon, Quebec, 1895, page 102.

² See appendix A 10.

³ *Ibid* No. 6.

⁴ See appendix A No. 8, also *Transactions of the Royal Society of Canada*. Second Series Vol. X. part 2, page 13.

⁵ *Ibid*.

⁶ See appendix A No. 4.

⁷ See appendix A Nos. 3 and 5.

⁸ See appendix A No. 6.

⁹ See appendix D No. 19.

In the instructions of Congress, issued February, 1776, appointing commissioners to Canada, it was especially stipulated that a printer should be sent with them to establish a free press in the country. Samuel Chase, one of the commissioners, was detailed to confer with Fleury Mesplet about undertaking this work; and he, without much hesitation, accepted the engagement, as he states in his answers to questions by Congress, "with as much the more pleasure as it was promised me that I would receive every satisfaction and regard that my services would deserve."¹ To this acceptance the only conditions he attached were, that one hundred dollars should be advanced to enable him to cancel his lease, and that his expenses should be paid to Montreal. After this a committee of Congress was appointed, consisting of John Hancock, the president; Mr. Thompson, the secretary, and Benjamin Franklin, to examine as to Mesplet's fitness for such a duty. The examination having proved satisfactory \$200 was voted by Congress on the 26th of February "to defray the expence of transporting him, his family and his printing utensils to Canada."² This arrangement having been accepted, Mesplet had to hurry up his preparations. He engaged a fellow-countryman, named Alexandre Pochard, whom he styles "Homme de lettres," as editor of the proposed newspaper, two journeymen printers named John Gray and Mr. Hearse, and a servant-man. As Congress provided no money for carrying on the operations of Mesplet's press he, if he were expected to do things right when in Montreal, required a good working capital. So he, being unable to find accommodation elsewhere, again had recourse to his friend Berger, who had saved him from financial embarrassment the previous year. Berger evidently seems to have been a man of means, for, notwithstanding his past advances, he put up £1,000 Pennsylvania currency, equal to \$2,666—a goodly capital for a printing office of those days—besides purchasing a supply of new type, 180 reams of paper, and other requisites to the value of \$786; over and above these amounts was \$560 for money advanced to pay Mesplet's debts, making a total of \$4,000 of Berger's capital in the concern. The only condition called for by Berger in his partnership agreement was that it should be on a limited basis with the proviso that he receive ten per cent interest on this amount whether the business proved profitable or not.³

All this goes to show Berger's continued and deep personal friendship for Mesplet as well as belief in his ability to carry on successfully a printing and publishing business in Canada; and further, confidence,

¹ See Appendix D No. 35.

² *Ibid.* Nos. 29 and 35.

³ See appendix F No. 53.

on the part of both, in the good faith and in the power of Congress and its commissioners to win over the Canadians and to retain possession of Canada. But this turned out as Franklin's one notable diplomatic failure. That diplomacy which had secured the adhesion of all the thirteen colonies and at a later date the active sympathy of France proved powerless to move the passive indifference of the Canadians.

Such was Mesplet's confidence in the ultimate success of the revolt of the thirteen colonies that, after accepting their commission as Canadian printer, he invested not only the whole of his free capital, but the money realized from the sale of part of the stock of books he had on hand, in continental currency; believing, as he claims, these bills to have been "as good as the banks of England or Vienna."² But this was a true case of misplaced confidence, for they turned out to be a total loss, as the greater part of them are entered in his post-mortem inventory as of no value.

By the 18th of March, 1776, Mesplet started from Philadelphia with the whole of his belongings loaded on five waggons. He and his party, which consisted of six persons, arrived at Lake George on the 8th of April, where they had to wait eight days until his goods arrived, and been loaded on the five bateaux, he had secured at his own expense, for crossing Lake George and pursuing his course down Lake Champlain and the Richelieu river. He claims that on account of the portages his expenses were very great, far exceeding the paltry hundred dollars voted by Congress. As this was the time of spring high water his "pilotes" as he calls them, decided to run the rapids to Chambly and thus save him the longer land haul from St. Johns. But, through the fault of these pilots, his bateaux shipped much water in the rapids and were so nearly swamped, that most of his fine paper and books, together with his wife's wearing apparel and some of his own, were irretrievably ruined.² Although he reached Chambly on the 22nd of April he did not get to Montreal until the 6th of May. On his arrival, he, with wife, staff and servant, put up at a tavern, where they remained eleven days, at an expense of \$1.07 each per day, or \$70 in all, while premises were being leased, furnished and fitted up as a printing office. It was therefore not until the 18th of May, just two months after setting out from Philadelphia, that he was ready for business.

Where did this house, fitted up as Montreal's first printing establishment, stand? An imprint gives the address as "près le marché," and a document more fully expresses it as "demeurant en cette ville rue

¹ See appendix D. No. 34.

² *Ibid.* D. No. 34.

Capital.”¹ This street, wide enough at the time it was opened up, but now considered a narrow lane, parallel with and between St. Paul Street and the river front, extends from St. Sulpice (St. Joseph) to St. Francois Xavier Streets; crossing in its course the Market Place, now Place Royale. We may therefore conclude that this house stood on or near the site now occupied by the Sailors Institute. The place was fitted up, part as a book store, part as a dwelling, with the garret as the printing room. Here Mesplet remained, from all we can make out, until May, 1788, when he transferred the scene of his labours to 44 Notre Dame Street, near the Recollet monastery, which stood between St. Helen and St. Peter Streets.

But before he was ready for work his patron, Franklin, had departed, convinced of the failure of his mission. The other commissioners remained until the 29th of May to close up affairs; and by the 10th of June the Continental army had evacuated Montreal, leaving many unpaid debts behind, besides the worthless continental currency with which the country had been flooded. Mesplet having all his capital locked up in his type and presses and this same continental currency, found it impossible to get away, and probably feeling more at home and more hopeful of succeeding among a people speaking his own language, decided to remain and with his staff continue the business. But no sooner had the “loyalists” returned to Montreal than they began so to regard Mesplet with such suspicion that, on the 18th of June, he and the whole of his party were arrested, as sympathizers with the rebels, and detained in prison for twenty-six days. During this imprisonment he was subjected to all sorts of indignities.²

On the 14th of July, having been released, he was again ready for business, but the issue of a newspaper had to be postponed, for Mr. Pochard became so disgusted with the unceremonious treatment and imprisonment to which he had been subjected, determined to leave the country. He demanded compensation for his time since he had been engaged in Philadelphia and the cost of his passage to France, which items Mesplet had to meet to the extent of \$160.³ This proved an unfortunate occurrence for, while delaying the issue of the proposed paper for two whole years, it brought Mesplet under the questionable influence of the new editor, an influence that did not conduce to his political or moral advancement in the new atmosphere in which he found himself.

¹ See appendix E 56.

² See appendix D No. 33.

³ *Ibid* Nos. 33 and 42.

Although Mesplet complains that most of his paper was destroyed by water, when he ran the rapids between St. Johns and Chambly, and that he had to wait in idleness, for paper ordered from London, until the spring of 1777, we have the titles of three books, one of them a bulky volume of 600 pages, printed during the latter half of 1776. Besides these a number of others are mentioned in the first inventory, some of which were, no doubt, printed during this period.¹

It was early during the latter half of 1776 that the second edition of "*Règlement de la Confrérie*," the first book printed in Montreal, was issued for and on account of the Seminary of St. Sulpice.² A number of copies were found some years ago among the archives of the Notre Dame Street house of that institution, where they had lain ever since they had been printed. Although perfect, they were only bound in wall paper, which goes to confirm Mesplet's claim that his fine paper was destroyed on his way to Montreal. "*Jonatas et David Tragédie*," is the title of another work, printed for the Seminary of Montreal.³ As it was to be played by the students of the seminary, we may conclude it was written by one of the members of the order, and as such is the first Canadian dramatic work printed in Canada. It is also claimed to have been the first work printed in Montreal, but this is unlikely, for, as the play would not be given until the long winter evenings, it would not be wanted until late in the year. Therefore the "*Règlement*" still holds priority.

Now, regarding the third of the books printed by Mesplet during his first year in Canada—"Cantiques de Marseille,"⁴ a reprint of a French Hymn Book—which claims on its title page to have been printed at Quebec, and which, as is shown above, Gagnon claimed to have been printed during the visit of 1775. Was it printed at Quebec? We have no other evidence that Mesplet did printing at Quebec. Is it likely that he packed up his presses and type and moved down to Quebec, printed a book of over 600 pages there, and then moved back to Montreal in little more than five months? Does it not seem more probable that the Quebec imprint was used with the view of securing the printing of the Quebec religious institutions? Mesplet believed they would prefer a printer who, by his language, was better qualified to do their work. This view is confirmed by an advertisement on the reverse of one of the preliminary pages by which Mesplet and Berger announced that they were prepared to print religious books for

¹ See appendix B Nos. 8-15.

² Appendix A No. 8.

³ *Ibid* No. 9.

⁴ *Ibid* No. 10.

the Quebec trade with neatness and despatch, and asked for the patronage of those interested in the dissemination of such literature.

In 1777 Mesplet printed his first *Almanach*,¹ the first Latin publication appearing in Canada,² the first book in the Iroquois language,³ and two religious books,⁴ besides a number of others, no examples of which are known to exist.

In 1778 he issued his second almanac, but with the name changed from "Almanach Encyclopédique," to "Almanach curieux et intéressant."⁵ Two more religious books—"Neuvaine de St. François Xavier,"⁶ and "La semaine sainte"⁷—and a reprint of a French book entitled "Abrégé des règles de la versification française."⁸ This latter publication shows that at that time there was sufficient aspiration after poetical composition in Canada to make it worth while to reprint a work giving poetical rules. The first work of a historical character, "Journal du Voyage de St-Luc" also bears date 1778.⁹

But the most interesting of Mesplet's publications in 1778 was "La Gazette du Commerce et Littéraire."¹⁰ An editor had been secured in the person of Valantin Jautard, an advocate, who came originally from France about the year 1768. He was a sympathizer with the Continental Army, for, in the Canadian archives,¹¹ mention is made that he was appointed a notary in January, 1776, by General Worcester. He does not appear to have practised the notarial profession after this army had evacuated Canada, as no repertoire of his papers are to be found in the Court House at Montreal. Before publishing his paper Mesplet issued a prospectus,¹² setting forth that it was to be a four paged quarto at \$2.50 a year. Merchants and professional men were asked for their support as it would be a medium for advertising,¹ besides providing commercial news and good literature. At the same time, he engaged not to publish anything likely to prove offensive to the church or the state. He also wrote to the Governor-General asking for permission to publish the paper, with the same promise to refrain from discussing interdicted subjects.¹³

¹ Appendix A No. 11.

² Appendix A No. 14.

³ Appendix A No. 12.

⁴ Appendix A 13 and 15.

⁵ Appendix A-No. 16.

⁶ Appendix A No. 13.

⁷ Appendix A No. 12.

⁸ Appendix A No. 20.

⁹ Appendix A No. 19.

¹⁰ Appendix A No. 21.

¹¹ Canadian Archives 1888, Haldimand papers, page 917.

¹² See appendix C No. 4.

¹³ See appendix C No. 3.

The choice of Jautard as editor was most unfortunate, for, soon forgetting, or ignoring the publisher's promise to steer clear of things religious and political, he started a tirade against both, which he kept up with short intermissions to the end; for, while the first number of the *Gazette* appeared on the 3rd of June, a month had not elapsed ere Mesplet and his editor, Jautard, were ordered by Guy Carleton to leave the province before the 15th of September. Mesplet continued the issue of the paper regularly until the 19th of August, when it appeared as a single page consisting of a letter from the "printer" "to the public," which complained that: "Since a few days I have had a fresh grievance which constrains me to cease publishing my *Gazette*. This new one has almost decided me; I have too many enemies. The slightest move on my part, however innocent, increases the number; and I owe it to myself to be saved from further persecution.

"Nevertheless, I will continue, if authorized by the government and encouraged by an increase in the number of subscribers. I prefer to sacrifice my own interests to exposing myself to further disgrace; and, if I may presume to say so, I flatter myself that those who lauded my enterprise in establishing a periodical will be pained at its being discontinued." The appeal had the desired effect. It stirred up his friends to action; for a numerous signed petition¹ was presented to the governor, setting forth the benefits the paper had been to the community, the need of a printer in the city, and Mesplet's good character and asking that the order for him to leave the province be not enforced. In compliance with this petition General Haldimand, who had just replaced Carleton as governor, issued, on the 24th of August, a notice signed by his secretary, Edward Foy,² suspending, for the time being, the order for the banishment of Mesplet and his associate, on condition that they take the oath of allegiance within two days and submit all their articles to an inspector, to be appointed by the governor before publication.

The first censor appointed for this duty was a Mr. Gordon, but, as he left for England shortly afterwards, the office was allowed to fall into abeyance, and the paper being left to itself returned to its old course and again came under the displeasure of the authorities; for, on the 28th of September, in a letter to Cramahé, Haldimand writes: "I have observed several improper things published in our *Gazette*."³ and later Cramahé replies: "Our printer has a *penchant* to the popular

¹ See appendix C No. 7.

² *Ibid* No. 8.

³ *Ibid* No. 10.

cause,"¹ implying thereby that he was in open sympathy with the cause of the thirteen colonies with which the country was then at war.

It was at this time that the title of the paper was changed to *La Gazette Littéraire*, and the name of Berger dropped, from the imprint.² Hereafter that of Fleury Mesplet appears alone. It would also appear that there was some attempt on his part to propitiate the religious authorities, for in October he advertises a number of religious works which, no doubt, the Seminary authorities had obtained leave to import from France, and which were placed in his hands for sale, as the only bookseller in Montreal. The purpose of the Seminary in thus putting them before the people was to combat the materialistic tendencies of the paper as the titles of the works would seem to indicate. They are:

1. "Dictionnaire Anti-Philosophique," 2 vols., Paris, 1775.
2. "Dialogue tiré du Dictionnaire Anti-Philosophique."
3. "Lettres de quelques Juifs."
4. "L'Autorité des livres du Nouveau Testament."
5. "Réponse critique à plusieurs difficultés."
6. "Dictionnaire de la Religion."

Possibly one or two of these may have been printed by Mesplet, as a number of copies of "Dialogues" are mentioned in the inventory.

What caused the religious authorities most concern at that time was a discussion, carried on in the *Gazette*, on the merits and demerits of Voltaire, whose death had just been chronicled. This led to a strong protest on the part of M. Montgolfier, superior of the Seminary of St. Sulpice, who, on the 2nd of January, 1779, wrote to Haldimand to the effect that the reflections of the *Gazette* against religious things should be interdicted. In his capacity as superior he acted as supervisor of the religious affairs of the district.

Haldimand, in his reply,³ states that he had already warned Mesplet to moderate the tone of his "sheet," and that should he continue to pursue the same course, steps would be taken to stop its further issue. He further suggested to the superior to keep a look-out on its pages and advise as to any further indiscretions.

The issue from Mesplet's press in 1779, apart from the numbers of the *Gazette*, was his third almanac,⁴ with several new features. Be-

¹ See appendix C No. 11.

² It had never filled the role of catering for the commercial interests of the community or become a medium for merchants to advertise their goods. It was purely literary written mainly by the editor Jautard.

³ See appendix C No. 13.

⁴ See appendix A No. 22.

sides this there was advertised in the *Gazette* of the 14th of August "Mémoire de P. Mézière comme avocat des Dames Religieuses des Trois Rivières & La réponse de François LeMaitre Duême, ces ouvrages serviront à faire distinguer le bon du mauvais."¹ No copies of these are known.

Jautard, who also practised as a lawyer, often discussed his cases in the *Gazette* under different *noms de plume*, and his criticisms were sometimes unscathing. He was a ready writer and usually filled the paper with his own effusions, to the exclusion of all news, even the town gossip. He even went so far as to criticize adverse judgments of the court. One of these he handled so severely that the judges passed an order interdicting him from appearing before it. They, at the same time wrote to Haldimand complaining of the attitude of the paper. The next day Jautard appeared as usual when, before the opening of the court, Judge Southouse informed him that he was no longer entitled to occupy a seat among those reserved for attorneys. Jautard objected to this decision on the ground, among others, that his accuser's name had not been given, and that he had had no opportunity to appear in his own defence. He also affirmed that he had not criticized the court under his own name. To this the judge replied that it was not necessary to give the name of the accuser, that Jautard was under suspicion of the government and that the style of his writings showed him to be the author of the criticism in question, although it did not bear his name.

The next number of the *Gazette* contained four different articles criticizing this act of the judges. One over Jautard's own name, giving his version of the affair, a second over the *nom de plume* of "Le Spectateur tranquille" (which was really Jautard's own writing), complimented him on his dignified attitude under such trying circumstances. The third was addressed to Jautard by Ducalvet, also complimenting him on his stand in court, and the fourth was addressed to Judges Rouville and Southouse, by Ducalvet, charging their acts and judgments with partizanship.

On the appearance of this number, which is dated the 26th May, 1779, Judge Hertel de Rouville wrote to Haldimand enclosing a copy of the paper² and asked that the court and judges be protected from

¹ This memoir refers to a suit taken out by the Ursulines of Three Rivers against François Le Maitre Duême or Duhaime for some sort of trespass on their Seigniorship. Judgment had been given against them in favour of Duême. This judgment was afterwards confirmed in an appeal to the Privy Council. Jautard no doubt had something to do with the case. See "Les Ursulines des Trois Rivières," 1888, Vol I., page 415.

² See appendix C No. 14.

such attacks. This capped the climax, for Haldimand, who had up to this time considered himself long suffering, took vigorous action and issued a warrant¹ to Major Nairn, in command at Montreal, to arrest both Jautard and Mesplet. He also gave orders to the commander of the armed schooner *Mercury* to proceed to Montreal,² so that the prisoners could have a safe conveyance to Quebec. They were arrested on the 4th of June and, without being allowed to communicate with each other or with any of their friends, were at once sent down to Quebec. The last number of the *Gazette* appeared on the 2nd of June, just one year after its commencement. Thus was the first French literary periodical in America snuffed out.

On their arrival at Quebec they were conducted to the military prison and confined in a large room already occupied by another state prisoner named Laterrière, who afterwards wrote a memoir describing "Ses traverses." In this memoir he states that Jautard and Mesplet were imprisoned, the one as editor and the other as printer of a libellous periodical known as *Tant pis, tant mieux*, which "attacked the wise politics of the English government and contended against the administration of the Swiss Haldimand."³

May we not pause for a moment to find out something about the publication that Laterrière thus describes. Was it a true satirical paper as is claimed by Sulte?⁴ Had it a real existence as is ascribed to it by Miss Jane N. Mellwraith in her story of "Sir Frederick Haldimand," which states that: "Mr. Mesplet and his editor, M. Jotard did not succeed in adhering to these admirable resolutions, but sent forth a scurrilous sheet called *Tant pis, tant mieux*—the first French journal published in America—defaming all the King's officers and trying to throw the colony into confusion?"⁵ Or are we to conclude with Abbé Camille Roy, that it was simply a broadside struck off and distributed freely?"⁶ Now the facts of the matter are: Laterrière is the only contemporary that mentions such a periodical; no copy of it is to be found anywhere, and it is altogether unlikely that two periodicals of a like nature would be issued by the same publisher at the same time, especially as there was barely enough subscribers to sustain one.

¹ See appendix C No. 16.

² *Ibid* No.19.

³ Pierre de Salle Laterrière et ses traverses, Quebec, 1873, page 217. See also appendix G No. 80.

⁴ Histoire des Canadiens Français, Vol. VIII., page 136.

⁵ The Makers of Canada, Sir Frederick Haldimand, Toronto, 1904, page 277.

⁶ Etude sur l'histoire de la littérature Canadienne, by Abbé Camille Roy, in Bulletin du parler Français au Canada, Québec, 1905, Vol. III., page 239, note 2.

In seeking for a solution of this matter I found in the last number of the *Gazette* a valedictory article, no doubt by Jautard, entitled *Tant pis, tant mieux*—rather cleverly written—in which he rings the changes on this phrase. He begins with, “The newspaper is about to be suspended — *tant pis*, which may be translated, “so much the worse.” “On the other hand many claim that being generally lauded it will be continued — *tant mieux* — so much the better.” This goes on through twelve short paragraphs, in which he brings in the different *noms de plume*, which subscribe to the different articles in the *Gazette*, in each finishing the first part with *tant pis* and the last with *tant mieux*. His concluding paragraph may be here translated: “Thus, when all is well considered, there will be found the worse and the better; so much the worse for some, so much the better for others.”

This article, according to my conclusion, is the origin of the *Tant pis, tant mieux* of Laterrière who, having spent nearly a year in prison had no knowledge of *La Gazette Littéraire*, and who, therefore, when he heard Jautard speaking of his article, *Tant pis, tant mieux*, jumped to the conclusion that this was the title of the paper, especially as the phrase fitted in with what he had learned of its character. Jautard, if at the time he saw Laterrière’s mistake, did not take the trouble to correct it and so it was given out, taken up and passed on by some of our best writers. *Tant pis, tant mieux* then is not the title of a paper, but only that of an article.

Laterrière gives Jautard a most unenviable character, representing him as satirical, as sophistical, as a lawyer so brazen faced that nothing could astound him, as a drunkard, as false, as a liar like the devil and as a great gourmand. He hated all things English, was Jesuitical, full of prejudices, and above all things, most undesirable as a friend. He appeared to be well educated, but without culture. His influence over Mesplet, which seemed almost supreme, was very bad, for the latter hardly ever spoke without taking the cue from his editor. Mesplet’s education was much inferior, as he was simply a working printer; nevertheless, he appeared not to be devoid of ability and of a general knowledge of things. He is described as a cheat, almost as big a liar as Jautard, and of such an evil genius, which, had it not been ameliorated by his wife, who was a superior woman, would have led him to do many things unworthy of an honest man.¹

Such is the portrait of Mesplet and his editor drawn by Laterrière, who seems to have conceived an antipathy towards them, as well as they towards him; while he was at the same time attracted by a fourth

¹ See appendix No. 80.

prisoner, a Scotsman named Hay. On account of this choice he, as he claims, became the object of their jealousy. They appeared to be most quarrelsome, especially in the afternoons after they had been drinking—though he does not inform us as to how they got their liquor while in jail. Mesplet was to Jautard like Soutar Jonny, described by Burns, was to Tam O'Shanter.

“His ancient trusty, drouthy cronie.”

Laterrière states that nearly every afternoon, after indulging together, they attacked him, but never singly. Happily, being young and strong, he was able to master them both; and thus suffered no injury.

After some time Mesplet's wife was permitted to visit him and even to spend nights in prison with him. And to make it more convenient each of the prisoners partitioned off a sleeping apartment for himself. She, as well as her husband, petitioned on several occasions, and on one occasion Mesplet and Jautard together, asking to be liberated or brought to a speedy trial; claiming that they were altogether innocent of any wrong-doing,¹ Madam Mesplet further offered to furnish two securities to vouch for her husband's good behaviour should he be released. In another petition,² in which he is joined by Laterrière, Mesplet asks to be permitted to take exercise in the jail-yard, as his health suffered from close confinement. As no heed was given to these petitions for liberty they continued in durance till the close of the war when strict surveillance was relaxed. So, on the 1st of September, 1782, Mesplet escaped,³ apparently with the connivance of the authorities, who were thus satisfied to have been relieved of responsibility, as the arrest of these people and their detention for three years and three months, without trial, was a violation of all the principles of British justice.

What was done with Mesplet's press and plant during all this time? According to Major Nairn it was seized and a kind of inventory taken.⁴ It evidently remained in Mesplet's house on Capital Street, for he returned there and at once began work after his release. Did it stand idle? Most probably, as we have no imprints save one dated during these years. This one deserves a word. It is explained in a letter by Colonel D. Clause to Haldimand,⁵ in which he states that the Mohawk prayer book having proved so successful he had tried his hand in his

¹ See appendix C No. 26.

² See appendix C No. 24.

³ See appendix D No. 33.

⁴ *Ibid* C No. 20.

⁵ *Ibid* C No. 25.

leisure hours on a Mohawk Primer. He had found great difficulty in correcting the proof of the Prayer Book, which was printed at Quebec, and at the same time attend to his duties at Montreal.¹ We may therefore conclude that finding Mesplet's press standing idle under seizure by the government, he availed himself of this opportunity and, securing the services of a journeyman printer, had the Primer set up under his own supervision at Montreal; especially as Mohawk is most difficult composition for type-setters.

As soon as Mesplet was released he secured an order for a *Psautier*² for the use of the schools in which a wood cut appears, which is claimed, in the Hart Catalogue, to have been the first wood engraving done in Canada, and to have been the first school book issued in Montreal. Both are simply assertions without any other authority.

In 1783 a copy of the treaty of peace between Great Britain, France and the United States, signed in January of that year, was printed by Mesplet,³ also a petition he presented to Congress.⁴ Dionne mentions an almanac for 1783,⁵ but I have not been able to verify this statement by an existing copy, so do not include it in the list.

This year he claimed from Congress compensation for the losses he had sustained in accepting their engagement as printer at Montreal and on account of his sympathy with their cause, but this petition met with no response.

There were only two publications printed in 1784, the almanac,⁶ of which only one incomplete copy is known; and this is the last year of issue so far as extant evidence goes. After this he issued large single paged "Calendriers." The second was "L'écu de Six Francs," a short story.⁷

In September of this year Berger, whose partnership continued from about September, 1775, to September, 1778, came to Canada to arrange a settlement. He is described as a merchant of France. As there arose some dispute about the details of the account it was agreed to settle the matter amicably by each party appointing two arbitrators.⁸ As the account was somewhat complicated the arbitrators referred the disputed points to Mr. Benjamin Frobisher, one of

¹ See Bibliography of the Iroquois language, Pilling, Washington, 1888, page 46.

² See appendix A No. 24. Also Catalogue of the Hart Collection, Boston, April 15-19th, 1890.

³ See appendix A 25.

⁴ *Ibid* No. 26.

⁵ Page 14.

⁶ See appendix A No. 27.

⁷ *Ibid* No. 28.

⁸ See appendix F No. 51.

the principal merchants of Montreal and, on his advice, fixed the amount due Berger at \$4,800.¹ This award shows that not a single cent, principal or interest, of the debt, contracted away back in 1775 and 1776, had been paid. Berger accepted in settlement of this claim a notarial bond for \$1,200, payable in four equal annual instalments, and a note signed jointly by Mesplet and an individual named Marassé for \$460. Berger, in the goodness of his heart and in consideration for Mesplet's misfortune, wiped out the balance, \$3,140.² But from the post-mortem inventory we learn that Berger never received any payment on the bond. The joint note with Marassé for \$460, which appears on the inventory as a debt due that person, was the only money Berger had received on account of his advances to Mesplet.

Berger made out a power of attorney³ in favour of Louis Hardy and J. C. Herse to collect this debt, and in February, 1785, left for France. This was the only occasion on which he came to Canada, although he is represented on imprints jointly with Mesplet from June, 1775, to the first of September, 1778.

On the 26th of June, 1784, Mesplet again memorialized Congress regarding his claim for compensation for losses,⁴ but this petition, after having been looked into was tabled. He was thereupon advised by some friend in charge of his claim at Philadelphia that nothing more could be accomplished without an appeal in person. This Mesplet complained he could not do on account of lack of funds to pay the expenses of a journey to and a sojourn at that place. But at length, by the kindness of a friend who advanced the necessary funds Mesplet appeared before Congress with another petition. This was in March, 1785. A committee was appointed which, after asking for a bill of grievances and a statement, took the matter up. The bill and the statement⁵ give us many details of Mesplet's journey from Philadelphia to Montreal, which are most interesting. According to the latter the expenses of Mesplet's journey and his losses through imprisonment totalled up to \$9,450. This claim was backed up with a number of affidavits which attested to his sufferings and losses through devotion to the cause of the United States. In April he went to New York armed with a letter of introduction from Thomas Mefflin to the Hon. Mr. Hardy, a representative from Virginia, asking his assistance in pushing the claim.⁶ After all this effort, the committee reported on

¹ See appendix F No. 53.

² See appendix F No. 54.

³ See appendix F No. 55.

⁴ See appendix D No. 34.

⁵ See appendix D No. 42.

⁶ See appendix D No. 41.

the 27th of May, favouring the granting of "\$426,45-90 to Mr. Fleury Mesplet on account of expenses attending the transporting of himself, family and printing utensils from Philadelphia to Montreal."¹ This appears to have been for the bare expenses of the journey to Montreal, without taking into account the loss by imprisonment or otherwise; and it was far from satisfying him, for in June he presented another memorial² setting forth the utter inadequacy of the sum voted to cover his losses. He claimed that it was insufficient to cover his outlay in securing it, which included expenditure for the services of an attorney, the cost of his trip to, and three months' sojourn in Philadelphia. This was his last appeal to the United States. He had wasted time and money without any practical result, and from henceforth became a good and loyal Canadian.

The same year Joseph Marie Desautels finding it impossible to collect his claim against Mesplet—he had secured it by notarial bond the previous year³—took out an action against him in the Court of Common Pleas, and on the 22nd of July was granted a judgment for \$1,481.⁴ This case was taken out against both Mesplet and Berger but the latter through his attorney, P. Mézière, proved that he was not liable for the debt, while Mesplet acknowledged the debt by confessing judgment. It may be worth while to note that the claimant was represented by Thomas Walker, celebrated in connection for his sympathy with the continental army, and for having entertained Franklin when he visited Montreal. Mesplet who, at that time, owed over \$5,000,⁵ tried to arrange a compromise. He only asked for an extension of time, offering his presses and other plant as security.⁶ But Desautels, noting that he was hopelessly insolvent, took out an execution and Mesplet's effects were disposed of by a bailiff's sale in October.⁷ The whole sale realized a little over \$600, not half the indebtedness to Desautels alone, who bought in the two presses and type for \$290, besides books and sundry other articles aggregating altogether to \$443, more than two-thirds of the whole. It would appear by the final inventory that Desautels bought the presses for Edward William Gray. From this time out Mesplet never owned his presses, although afterwards he, from time to time, bought fresh supplies of type. Gray, although, no doubt, he bought the plant at a bargain, could not find

¹ See appendix D No. 31.

² See appendix D No. 43.

³ See appendix F No. 56.

⁴ *Ibid* G No. 78.

⁵ *Ibid* F No. 60.

⁶ *Ibid* F No. 58.

⁷ See appendix F No. 61.

another printer to take it off his hands or undertake the work, was obliged to fall back on a lease of the plant to Mesplet at the risk of never being paid or having to let the whole lie idle. From the details of this sale, which are most interesting, we learn that Mesplet, who is often represented on imprints as bookseller as well as printer, sold mainly his own publications, and such stationery as was then used; although from an earlier announcement he offered a few works by other printers he appeared to have none on hand at the time of this sale. His stock of publications, of which the major part was in sheets unbound, was very large, even when compared with the demand for such literature to-day. He had as many as 500, 750 and 1,000 copies of some lines.¹ Only six of the fifteen books mentioned in this sale are otherwise known to bibliophiles.

Among the purchasers at the sale was Jautard, who evidently had some means, as he stands third highest on the list. This is the last occasion we hear of him in connection with Mesplet. The latter seems to have broken away from his former editor after his release from prison. Jautard afterwards got in tow with a widow named "Madam Deganne," who appears to have had some means. He borrowed money from her, and then married her to cancel the debt. At that time he is represented as living at Côte St. Paul.

His only publication in 1785 was the *Montreal Gazette*,² the first number of which appeared on the 28th of August. It was a four-paged folio, printed in French and English. All controversial matters were carefully avoided as it dealt mainly with general and local news. It was much less original than *La Gazette Littéraire*, so escaped falling under the ban of those in high places. It proved so successful that it still lives, while all its contemporaries — if we except the *Nova Scotia Gazette* which, being a government organ, is outside the strict classification of true newspapers, have ceased to appear.³ It has therefore outlived all of its contemporaries and many later Canadian publications. Although the price, \$3.00 per annum, appears high for a small four page weekly when compared with one of our sixteen page dailies which cost no more, it had a good subscription list extending all the way down the banks of the St. Lawrence to Quebec; while there was hardly a prominent citizen of Montreal, French as well as English, whose name was not among

¹ See appendix B Nos. 3-15.

² See appendix A No. 29.

³ The *Halifax Gazette* was first issued on the 23rd March, 1753. Afterwards the title was changed to the *Nova Scotia Royal Gazette* under which title it is still issued as the official organ of that province.

the list of subscribers. On the 24th of September the *Gazette* consisted of a single page containing simply a letter in French from Fleury Mesplet addressed, "A Messieurs les Souscripteurs," which shows that the paper came near ceasing to be published. It states that, "You will be surprised at not receiving your *Gazette* this week, but I hope you will bear me no ill will, because it is not the result of my negligence. I owe it to myself as well as the public to be on time, and I believe that up till the present not one of you gentlemen can reproach me. A derangement in my affairs (the cause of which, I believe, you all know) has stopped my work and rendered it impossible to supply to-day what I have engaged to do. I flatter myself that next week I will be in a position to give such full satisfaction as lies within my power and to continue with the same zeal to give you proofs of my assiduity." This derangement, no doubt, arose out of the seizure of Mesplet's effects by Desautels.

In 1786 no extant publication appeared; but in 1787 there are three: A funeral sermon preached by the Rev. D. C. Delisle on the death of Joseph Frobisher,¹ who had acted two years before in settling the award between Berger and Mesplet. There was a medical work on how to combat a plague that had broken out at Baie St. Paul,² and his first English book—"The Manual Exercise,"³ which was printed on the order or approval of the military authorities. This shows that Mesplet had now secured the good will of the government.

1788 is again another year in which there are no extant imprints; but a lease was signed with J. B. Tabeau for a house on Notre Dame Street.⁴ The location of this house is given in one document as No. 44, and on the "Juge à Paix," as near as the Recollet fathers fix it about the corner of St. Helen Street. As there is no evidence that he moved before this time we conclude that the printing office of Mesplet continued at the first location in Capital Street from May 18th, 1776, until May 1st, 1788, a space of twelve years.

The only publication dated 1789 was "Le Juge à Paix,"⁵ a thick book, issued in parts, the first of which appeared in March. This book, which is comparatively common, is a translation of an English work by Richard Burn, and the parts were known as "Traduction de Burn's Justice." In the *Gazette* of that year there are advertised "Le Calendrier de Montréal pour l'année 1789," and "Tableau des rues et faubourgs de Montréal."

¹ See appendix A No. 30.

² See appendix A No. 31.

³ See appendix A No. 32.

⁴ See appendix F No. 62.

⁵ See appendix A No. 33.

On the 1st of September Marie Mirabeau, Mesplet's faithful wife, died at the age of 43;¹ no doubt worn out through privations and worry during her husband's long imprisonment, accelerated also by his financial embarrassment.

Mesplet did not continue long a widower, for on the 23rd of April, 1790, after an interval of little more than seven months, he married Marie Anne Tison, daughter of Jean Baptiste Tison,² a girl of 23 years, while he was himself over 55. She had been left a small competence by her deceased mother which attracted Mesplet, while she was glad to escape from the supervision of a stepmother, even by marrying a man who was an insolvent and more than twice her age. In any case, this inheritance soon served to tide the husband over a financial difficulty, for before the close of the year his wife had to become a party with him to a bond in favour of Charles Lusignan for \$174.³

This year he published, on his own account, a pamphlet of 32 pages, entitled "La Bastille Septentrionale, ou trois sujets britanniques opprimés," which describes a difficulty or quarrel arising out of the annual drill of the militia at Three Rivers.⁴ Although the subject seems most trivial it was evidently considered of sufficient importance at that time to command a ready sale, as from the title page we note that it was offered for sale throughout the province. Another pamphlet dated this year was "Memoire . . . de Jean Baptiste Lebrun,"⁵ which describes a lawsuit. This year Mesplet appeared as godfather and his wife as godmother to his brother-in-law, Fleury Tison. As he was named after Mesplet, we may conclude that the two families were on good terms;⁶ two days afterwards he again stood as godfather to the daughter of a friend.

In 1791 his only publication was "Memoire en cassation du testament de Simon Sanguinet,"⁷ a pamphlet of 19 pages, evidently a will case. There is nothing dated 1792, which shows that Mesplet's business was dwindling away. Only three pamphlets, totalling 67 pages, appear among the works now extant as printed during the years 1790-2.

In May, 1793, Mesplet moved for the third time to a house, No. 46 Notre Dame Street, two doors east of the former stand, which was owned by the widow of Ignace Chenier, and was for a term of five years,⁸ although he did not live long to occupy it. The only book

¹ See appendix E No. 45.

² See appendix E No. 46 and F No. 64.

³ *Ibid.* F No. 65.

⁴ *Ibid.* A No. 34.

⁵ *Ibid.* No. 35.

⁶ *Ibid.* F No. 49.

⁷ *Ibid.* A No. 36.

⁸ *Ibid.* F No. 59.

printed in these premises was one for the military authorities, as it bears the superscription "By His Majesty's Special Command." It is entitled, "Rules and Regulations for Field Exercise,"¹ and this is Mesplet's last book.

Evidently about this time the type and other appliances necessary for his press room began to be pretty well used up, as the owner of the presses declined to make any renewals. Mesplet had to order a fresh supply from Europe through a Montreal merchant named Jean Baptiste Durocher. In settlement for the cost of this type which amounted to \$632, he, along with his wife, gave a bond in which the latter hypothecated to Durocher all her goods and furniture, besides her interest in the estate of her late mother.² This amount was not paid at maturity, but in 1795 Madam Mesplet declared that the total amount coming to her from her mother's estate did not exceed \$326.50, which amount was to be paid by her father at the end of two years with interest at six per cent.³ This settlement, which was guaranteed by her father, J. B. Tison, was accepted by Durocher and afterwards transferred to P. Huguet-Latour,⁴ who acknowledges to have received the amount with interest from Tison on the 22nd of November, 1797.⁵

The signing of this bond appears to have been the last transaction of any importance which Mesplet did, for six months afterwards — on the 24th of January, 1794 — he died, according to the parish register aged about 60 years.⁶ When he was married for the second time his age is given at 55, which would make him a year younger.

After the death of Mesplet his wife found his affairs so embarrassed financially that she appointed Charles Lusignan and Louis Hardy trustees, to take over the estate and settle it on behalf of the creditors.⁷ The inventory which they took valued his furniture and stock at \$783, and book debts at \$1,015, or a total of \$1,798, to cover liabilities ascertained amounting to \$3,546, besides a number of debts the amounts of which could not be determined. This inventory is a most precious document for, besides revealing Mesplet's financial condition, it gives us a view of the furnishings of his house and of his wearing apparel, both of which by the way were as sumptuous as that of a gentleman of means. From it we also get an idea of the utensils employed about a Canadian house one hundred years ago. It also

¹ See appendix A No. 37.

² *Ibid.* F No. 69.

³ *Ibid.* F No. 70.

⁴ *Ibid.* F No. 71.

⁵ *Ibid.* F No. 72.

⁶ *Ibid.* F No. 49.

⁷ *Ibid.* F No. 73.

describes very fully Mesplet's stock in trade as a bookseller. Apart from some books placed on sale, and one or two dictionaries, he had no stock of books, save those of his own printing. But his stock of stationery, on the other hand, was much more complete.

After the inventory was taken, Madam Mesplet finding that the estate was hopelessly insolvent, renounced any claim she might have had in the community of property,¹ and ordered the whole of the effects to be sold by auction on behalf of the creditors.²

The second Madam Mesplet like the first had no children, thus, although left destitute by her husband, she had only herself to provide for. According to the marriage contract she had inherited from her mother \$503.70, from which she paid \$194 due on Lusignan's bond and the \$326.50 above mentioned to Durocher; the two together more than swallowed this sum. By her father's will she was left a further sum of \$25,³ but this was so small as to be hardly worth mentioning. She never married again, although left a widow at the age of twenty-six. She died in 1840, aged 74.⁴ Her nephew, Mr. Jean Baptiste Tison, remembers *ma tante Mesplet* as a very old woman, but cannot relate anything she may have said about her husband.

Now, regarding the books and other publications printed by Mesplet; in list A are given all that are known to exist with their titles in full, the number and size of the pages and where copies are to be seen. These number 39, but there are some 36 others mentioned in advertisements and in the two inventories, bringing up the total to 75; all of which arranged according to subjects are given in Appendix B. Of these nearly one-third are religious and three official, for military purposes, showing that Mesplet must have repented and been received as a true son of the church and as a good citizen. He did honest work on fairly good paper, much better than in many longer established printing offices on this continent. His description of the stock, brought from Philadelphia, which included gold leaf and gilt, marbled, coloured and India paper, besides 80 reams of fine white paper, gives an idea of the quality of work he intended to do. His binding was also of good material and well executed, which shows that he was a thorough master of his trade in all its branches. The proof reading seems to have been well done, and, as he printed in four languages, we might almost say five, as the English style of spelling Iroquois was altogether different from the French, we can form some idea of his

¹ See appendix E No. 74.

² See appendix E No. 75.

³ See appendix G No. 77.

⁴ See appendix E No. 50.

capacity for undertaking difficult pieces of work. In one of these his name is even given in the Iroquois form.

What is there to be said as to Mesplet's character and disposition? Shall we accept Laterrière's estimate as conclusive and draw no other deductions? This estimate seems hardly fair. We must remember that it was formed under most unfavourable circumstances. Mesplet was in close confinement under which, being used to work, he chafed. Then there was Jautard's evil influence which, with enforced idleness and drink, would in many cases debase the sweetest disposition. That he did reform after his liberation is proved by the fact that he broke away from Jautard's influence and was received into the bosom of the church. That he was untruthful and ungrateful, or, to put it mildly, made promises he was unable to fulfil, is amply proved by his action in regard to his promise to abstain from all controversial subjects in his *Gazette Littéraire*, in his neglect to meet his bonds when due, and in his treatment of his friend Berger. The debt due the latter was altogether ignored, notwithstanding his many acts of kindness. In this Mesplet was most ungrateful. Another indication of his untruthfulness is the immoderate language used in his appeal to Congress, and this too, after settling down as a British subject, in which he claims that the ill-treatment at the hands of the Loyalists, whom he calls "Canaille," because of his sympathy with the cause of the united "did him honour." But Laterrière's assertion is not true; that he was actuated by "an evil genius, which, but for the softening influence of his wife, would have led him to commit many wrong things unworthy of an honest man."

From Cramahé's letter to Haldimand,¹ which states "when our printer has a cup too much, which is not seldom," coupled with Laterrière's account of the drinking bout every afternoon, we are forced to the conclusion that Mesplet's besetting sin was drunkenness and to this should be attributed his utter financial failure; nevertheless, he must have had some good qualities to secure the patronage he did and some attractiveness of manner to obtain loans and other financial help through all his business career.

While he had a fair education and was a most intelligent workman we may conclude with Laterrière that he lacked refinement and culture. The whole tone of his memorial to Congress, one of the few examples of his own composition we possess, bears this out.² The use of the expression "ces animeaux"—*these beasts*—stamps him as of a rather low nature—*grossière*—as the French would express it.

¹ See appendix C No. 10.

² See appendix D No. 33.

In disposition he was most sanguine, for he seems never to have faltered under a heavy load of debt and the chronic state of insolvency in which he always lived. And bearing up under this burden he was able to ward off his creditors by one means or another, while at the same time securing advances or fresh credit from new men. In only one instance was he sued and pushed to the wall. That was when sold out by Desautels. Each creditor in every financial transaction, save two, who were paid in full after his death by Madam Mesplet, lost part or whole of his debt, and these two, Charles Lusignan and Desautels, were paid out of Madam Mesplet's patrimony. Thus while able to ward off his many creditors, in ordinary ability and power to cope with and meet his financial engagements, he was altogether wanting, and yet through all he was a painstaking, honest and persevering workman.

Such then are the facts that have been gathered respecting our first Montreal printer. And, although this closer inspection has dispelled much of the glamour that has hitherto surrounded him, and shown him to have been ever very human and erring, yet, as a man labouring under great disabilities—desertion by his patrons, accused by the church, suspected by the people, imprisoned by the government, and borne down with debt—he rose above all and, persevering to the end, founded a free press, one that has uncovered the source of French literature in the new world, which, flowing in an ever widening, deepening stream, is clear and limpid when compared with the turbid flood inundating the old land.

APPENDICES.

A

List of Books, pamphlets, &c., printed by Mesplet, copies of which exist.

1773.

1. La | Louisiane | Ensanglantée, | Avec toutes les Particularités de cette horrible | Catastrophe, | Redigées | Sur le Serment de Témoins dignes de foi. | Par le Colonel Chevalier de Champigny. | Quidquid delirant Reges plechuclue Achivi | Virg. | A Londres, | Aux dépens de l'Editeur: | Chez Fleury Mesplet, No 24. Crown | Court, Little Russell Street, Covent Garden. | M.DCC.LXXIII.

Size 5 x 8, pp. XII. + La Louisiane. 123 + Notes XXX. + Memorial 32 = 197.

Copies known, P. Gagnon, Quebec; Library of Congress, Washington.

Described by Gagnon, *Essai de Bibliographie Canadienne*, Quebec, 1895, page 102, No. 765. A second edition was issued in 1776 and a third in 1781 under the title "Etat présent de la Louisiane." This book as is claimed by the preface was edited from the manuscript of a deceased English officer who had lived in Louisiana.

1774.

2. Lettre | Adressée | Aux Habitants | de la Province | de Québec | ci-devant le Canada | De la part du Congrès | Général de l'Amé- | rique Septentrionale tenu à Philadelphie | Imprimé & publié par ordre du Congrès | A Philadelphie, | De l'Imprimerie de Fleury Mesplet. | M.DCC.LXXIV.

Size 4½ x 7, pp. 18. Copies: Judge L. W. Sicotte, Montreal; Historical Society of Pennsylvania.

Mentioned in "Issues of the Press in Pennsylvania, 1685-1784, Hildeburn. Philadelphia, 1885-6, Vol. 2, page 192.

1775.

3. L'Inoculation | du | Bon sens | Par moi, & pour l'homme en général, | Tout lui plait & déplaît, tout le choque & l'oblige; | Sans raison il est gai, sans raison il s'afflige; | Son esprit au hazard aime, évite, poursuit, | Défait, refait, augmente, ôte, élève, détruit. | Boileau | A Philadelphie | chez l'imprimeur ambulant. | Avec l'approbation de la Société des Inoculés | M.DCC.LXXV.

Size 4½ x 7½, pp. 47. Copy, Late Mr. Justice Baby, Montreal.

Although this publication does not bear Mesplet's imprint it is claimed by Judge Baby, in a note attached, to have been printed by him as there was at that time no other French printer in Philadelphia to which the qualification Ambulant (itinerant) would apply. Corroborative of this claim is the fact that six copies of "L'Inoculation du bon sens" were found in Mesplet's stock after his death.

4. Lettre | Adressée | Aux Habitants | Opprimés | de la Province | de | Québec. | De la part du Congrès Général de l'Amérique Sep- | tentrionale, tenu à Philadelphie. | Philadelphie, Fleury Mesplet, 1775.

8-vo, pp. 7. Copy: Historical Society of Pennsylvania.

Mentioned by Hildeburn, Vol. 2, page 225.

5. Règlement | de la Confrérie | de l'adoration perpétuelle | du S. Sacrement | et | de la bonne mort, | Erigée | dans l'Eglise paroissiale de Vil- | le-Marie, en l'Isle de Montréal, en Canada.

Size 3¼ x 5, pp. 40. Copies: Judge L. W. Sicotte; Late Mr. Justice Baby.

Although bearing no imprint, there appears little doubt but that this little booklet was printed by Mesplet. He secured the order on his way back from Quebec in May or June, 1775. These were among some of the books that escaped while the bulk of the edition was lost through the shipping of water by the bateaux at Chambly in 1776, hence the need of a second edition. (Mentioned by Gagnon, page 412, No. 2691, and by Dionne, in *Inventaire chronologique des livres...*, publié dans la province de Québec, page 13, where he claims that it was most likely printed in France. But this seems altogether unlikely as all communication with Canada and that country had been prohibited.

6. Règlement | Militaire, | Concernant | La Police | et | La Discipline, | Que doivent observer les Troupes qui sont ou seront | dans la suite levées & payées par les Treize | Colonies unies de l'Amérique Septentrionale. | Traduit de l'Anglais par F. Daymon. | A Philadelphie; Chez Fleury Mesplet & Ch. Berger, | Imprimeurs & Libraires. | M.DCC.LXXV.

Size 8-vo, pp. 39. Copy: Historical Society of Pennsylvania.

Mentioned by Hildeburn, Vol. 2, page 265.

1776.

7. Aux | Habitants | de la Province du Canada. | A Philadelphia. | Chez Fleury Mesplet & Charles Berger, [dated] "A Philadelphie, le 24 janvier 1776" and signed by "John Hancock, President."

Size 8 x 12, p. 1. Copies: Historical Society of Pennsylvania; Judge L. W. Sicotte. The letter without imprint.

Mentioned by Hildeburn, Vol. 2, page 242.

8. Règlement | de la Confrérie | de l'Adoration perpétuelle | du | S. Sacrement; | et | de la Bonne Mort. | Erigée dans l'Eglise paroissiale de Ville-Mar- | ie, en l'Isle de Montréal, en Canada | Nouvelle Edition revue, corrigée et augmentée | A Montréal; | chez F. Mesplet & C. Berger, Impri- | meurs et Libraires, près le Marché, 1776.

Size 3 x 4¼, pp. 40. Copies: Judge L. W. Sicotte and about twenty others.

Described by Gagnon, page 412, No. 2691, and by Dionne, page 13, No. 8.

9. Jonatas | et | David | ou | le triomphe | de l'Amitié. | •Tragédie | En Trois Actes. | Représentée par les Ecoliers de Montréal | design | A Montréal; | chez Fleury Mesplet & Ch. Berger, | Imprimeurs & Libraires, 1776.

Size 4¼ x 7½, pp. 40. Copies: The late Mr. Justice Baby; P. Gagnon, Quebec.

10. Cantiques | de l'âme dévote | divisé en XII livres | l'on représente d'une manière nette & facile | les principaux mystères de la Foi, & les prin- , cipales vertues de la Religion Chrétienne | accomodés a des airs vulgaires | avec une augmentation notable: | le tout mis dans un ordre particulier. | Nouvelle édition imprimée sur celle | de Marseille avec son ancienne appro-

bation. Première partie, | par M. Laurens Durand, Prêtre | du diocèse de Toulon. | Implemini Spiritu Sancto loquentes vobismet ipsis in Psalmis & Hymnis & Cantecis spiritualibus | Cantantes, & Psaultentes in Cordibus Nestrís Domino. | Eph., ch. 6, v. 18 & 19. | à Québec, chez Fleury Mesplet & Charles Berger, Imprimeurs & Libraires, 1776.

Size $3\frac{3}{4} \times 6\frac{1}{4}$, pp. 610. Copies: Judge L. W. Sicotte; Mr. Justice Baby, and three or four others.

Mentioned by Gagnon, page 102, but the date is incorrectly given as 1775.

1777.

11. Almanach | Encyclopédique; | ou Chronologie | des faits les plus remarquables de | l'histoire universelle, depuis Jé- | sus-Christ; | avec les anecdotes curieuses, utiles | & intéressantes. | Mil-sept cent soixante dix-sept | A Montréal | chez Fleury Mesplet & Char- | les Berger, Imprim. Lib. | 1777.

Size $3 \times 4\frac{1}{2}$, pp. 60. Copy: The late Mr. Justice Baby.

This is believed to be first almanac printed in French in America.

12. Iontri8-aiestak8a | Ionskaneks | N'aieienterihag Gaiatonsera te Gari8toraragon. è Ong8e on8e Ga8ennotakon | *ornamental square* | Teiotiagi; | 8esklet, Tsi Thonons8te, Ok- | niore Tsi Iontkerontak8a. | 1777.

Size 4×7 , pp. 16. Copy: Historical Society of Wisconsin, Madison.

The first Iroquois book printed in Canada. Described as a "Mohawk Primer" by J. C. Pilling in The Bibliography of the Iroquoian Languages, Washington, 1888, page 90. It is probably the same publication as that mentioned in the post-mortem inventory under the title "Brochures de Prières Sauvages" of which there were sixteen copies.

13. Exercise | très-dévoit | envers S. Antoine | de Padoue | le Thaumaturge, | de l'ordre Séraphique | de S. François. | Avec un petit recueil de quelques princi- | paux miracles. | A Montréal, | Chez F. Mesplet et C. Berger, Imprimeurs & Libraires, 1777.

Size $2\frac{3}{4} \times 5$, pp. 88. Copies: Judge L. W. Sicotte; Cyrille Tessier, Quebec.

14. Officium | in honorem | Domini Nostri J. C. | Summi Sacerdotis | et | Omnium Sanctorum | Sacerdotum | ac Levitarum. | Monti-Regali; Apud Fleurium Mesplet | Typographorum & Bibliop. | M.DCC.LXXVII.

Size $4\frac{1}{2} \times 6\frac{1}{2}$, pp. 12. Copies: Judge L. W. Sicotte; Université Laval, Quebec, and four or five others.

The first Latin book printed in Canada. Described by Gagnon, page 355, No. 2581. Also by Dionne, page 13, No. 10, where by mistake he claims it was printed in Quebec. A manuscript copy exists in the library of the Archbishop of Quebec.

15. Catéchisme | a l'usage | du Diocèse | de Québec. | Imprimé par l'ordre de Monseigneur Jean | Olivier Briand; Evêque de Québec. | Première partie, | Contenant | le petit Catéchisme ou abrégé de la doctrine chrétienne. | A Montréal | chez Fleury Mesplet & Charles Berger, | Imprimeurs & Libraires, 1777.

Size 12 mo., pp. 205. Copy: Library of Parliament, Ottawa.

1778.

16. Almanach | Curieux | et intéressant; | Contenant la liste des prêtres & | Religieux Desservants les Eglises de Canada; la connaissance des | monnaies courantes, des Poids & | Mesures, & Anecdotes, Fables, | Curiosités Naturelles, & mille sept cent soixante dix-huit | A Montréal; | chez Fleury Mesplet et Char- | les Berger, Imprim. Lib. | 1778.

Size 3 x 4½, pp. 60. Copies: Université Laval, Quebec, P. Gagnon, Quebec.

17. L'Office | de la | Semaine Sainte, | Selon le Missel | & Breviaire romain; | Avec l'explication des sacrés Mystères représentés | par les cérémonies de cet office. L'ordinaire de | la messe, les sept psaumes de la Pénitence, les | litanies des Saints, et les Prières pour la Con- | fession & communion, tirées de l'Ecriture Sainte. | Imprimé sur la meilleure édition de Paris. | A Montréal, chez Fleury Mesplet & Charles | Berger, Imprimeurs & Libraires, M.DCC.LXXVIII.

Size 3½ x 6¼, pp. 410. Copy: The late Judge Baby.

This is the last book printed under the partnership of Mesplet & Berger, which continued from about September 1775 to September 1778.

18. Neuvaïne | a l'honneur | de St. François | Xavier, | de la Compagnie | de Jésus, | Apôtre des Indes & du Japon | A Montréal | chez Fleury Mesplet, Imprimeur & | Libraire, près le Marché, 1778.

Size 3¼ x 5, pp. 147. Copies: Judge L. W. Sicotte; The late Mr. Justice Baby.

19. Journal | du | Voyage | de M. Saint-Luc | de la Corne, Ecuyer. | Dans le navire l'Auguste, en l'an 1761 | A Montréal; chez Fleury Mesplet; Imprimeur et Libraire, M.DCC.LXXVIII.

Size 4½ x 6½, pp. 38 x 2—40. Copies: Université Laval, Quebec; P. Gagnon, Quebec.

Described by Dionne, page 13, No. 12.

20. Abrégé | des règles | de la | Versification | française. | Par Mr. Restant, Avocat au Parlement & ap- | prouvé de l'Académie des Sciences à Paris. | A Montréal; chez Fleury Mesplet, Imprimeur & | Libraire, M.DCC.LXXVIII.

Size 4½ x 6½, pp. 80. Copies: Late Mr. Justice Baby; Université Laval, Quebec.

As this book was advertised in La Gazette Littéraire of 2nd September, 1788, as for sale "chez l'Imprimeur," we have the exact date of its appearance and may conclude that its publication was Mesplet's own venture.

1778-1779.

21. Gazette du Commerce | et Littéraire, | Pour la Ville & District de Montréal | Montréal, chez F. Mesplet & C. Berger, Imprimeurs & Libraires. Afterwards changed to

Gazette Littéraire | pour la Ville & District de Montréal | Montréal, chez Fleury Mesplet, Imprimeur & Libraire.

Size 7½ x 9, pp. about 220. Copies: McGill University, Montreal, Université Laval, Quebec.

The first number appeared on the 3rd of June, 1778; the change in the title and imprint was made on the 2nd September, 1778, and the last issue on the 2nd of June, 1779.

1779.

22. Almanach | curieux | et intéressant; contenant l'Idée des Etats, Royau- | mes & Républiques de l'Europe | avec les Naissances des Princes & | Princesse; la liste des Prêtres & Religieux Desservants les Egli- | ses de Canada; la connaissance des | monnaies courantes, & la distance | mar- quée d'une Poste à une autre, | depuis Québec jusqu'à Montreal | mille sept cent soixante dix-neuf. | A Montréal; | chez Fleury Mesplet, Impri- | meur et Libraire. | M.DCC.LXXIX.

Size 3 x 4½, pp. 62. Copy: Université Laval, Quebec.

1781.

23. A | primer | For the | use of the Mohawk children | To acquire the spelling and Reading | of their own: As well as to get ac- | acquainted with the English Tongue, | which for that purpose is put on the | opposite page. |

Waerighwaghsame Iksa | ongoenwa Tsiwaondad-derigh- | honny Kaghya-dogsera; Nayondewe- | yestaghk ayeneanaghno don ayeghya- | dow Kani-yenkehaga Kaweanondagh- | kouh; Dyorheas-tagat oni tisinihadwea- | notea. | Montreal, Printed at Fleury Mesplet's, 1781.

Size 24 mo., pp. 97. Copies: British Museum, London; Wilberforce Eames, New York, and a private library in Brooklyn.

This is described by Pilling, pages 137-9, where he gives a fac-simile of the title page. A second edition was printed in London in 1786. Printed at Mesplet's press while he was a state prisoner at Quebec, under the supervision of the author, Col. Claus.

1782.

24. Pseautier de David, avec les cantiques à l'usage des Ecoles, à Montréal, chez Fleury Mesplet, 1782.

Size 24 mo., pp. 304. Copy: The Hart Sale, Boston, April 15-19, 1890. No. 1674.

The Catalogue has a note which states "Contains the first wood cuts made in Montreal (p. 299), and is the first school book issued in Canada." Both statements are doubtful.

1783.

25. Copies | Authentiques | des articles préliminaires | de la paix, | entre | S. M. Britannique, | S. M. Très-Chrétienne | et | les Etats-Unis de l'Amérique. | Signés à Versailles, le 10 janvier 1783. | A Montréal, | chez Fleury Mesplet, M.DCC.LXXXIII.

Size 4¼ x 6¾, pp. 25. Copy: Late Justice Baby.

26. To the Honorable the president and members of Congress of the United States | The memorial of Fleury Mesplet, of Montreal, in the Province of Quebec. | Montréal, août 1783.

Size 9½ x 13¼, pp. 1. Copy: Library of Congress, Washington.

1784.

27. Almanach | curieux | et intéressant | pour l'année | mil sept cent quatre-vingt-quatre. | A Montréal; | chez Fleury Mesplet, Impri- | meur & Libraire | M.DCC.LXXXIV.

Size 3 x 5, pp. 58, but not complete. Copy: Université Laval, Quebec.

Dionne, page 14, simply mentions an almanac of 1783, but without details, the existence of which I have not been able to verify. This is the last year of issue of Mesplet's almanacs, he afterwards issued the large single sheet calendars.

28. L'Ecu | de | Six Francs | A Paris | & réimprimé à Montréal, | chez Fleury Mesplet, Imprimeur | & Libraire | 1784.

Size 16 mo., pp. 35. Copies: Lucien Huot, Beloeil; P. Gagnon, Quebec.

Described with fac-simile of title page by Gagnon, pages 277-8, No. 2004. Mentioned also by Dionne, page 14, No. 16. On the title page is a small wood cut design with a liberty cap for the centre. Where was it engraved?

1785-1794.

29. The Montreal

Gazette

Gazette.

de Montréal.

From 25th August, 1785, to Mesplet's death, 29th January, 1794.

Size 10 x 15. Copies: One volume, McGill University; several volumes, Université Laval, Quebec.

1787.

30. Sermon | funèbre | prononcé à l'occasion de la mort de | Mr. Benjamin Frobisher. | *On the last page is the imprint.* A Montréal | chez F. Mesplet, Imprimeur, 1787.

Size 5 x 8, pp. 15. Copies: Judge L. W. Sicotte; the late Mr. Justice Baby.

This sermon was preached by the Rev. D. C. Delisle, a Swiss minister, who was brought out by the government and set over the Anglican Congregation at Montreal, of which Frobisher was a member. Mentioned by Dionne, page 14, No. 22.

31. Remarques | sur | la maladie contagieuse | de | la Baie Saint Paul, | avec la description de ses symptômes & la méthode | d'en faire la cure; | A l'usage du clergé, & autres messieurs résidents | à la campagne, | par | Robert Jones, chirurgien. | Non ignara mali miseris succurrere disco | verg. LIV-I | Mes malheurs m'ont rendu l'ami des malheureux. | A Montréal | chez Fleury Mesplet, Imprimeur-Libraire, 1787.

Size 5 x 7¼, pp. 22 list. Copies: The late Mr. Justice Baby, Montreal; Legislative Library, Quebec.

Mentioned by Dionne, page 14, No. 20, but copy lacks title page and the date is given through error as 1786.

32. The | Manual Exercise, | with | Explanations, as ordered by | His Majesty. | The second edition. | Montreal, Printed by Fleury Mesplet. M.DCC.LXXXVII.

Size 4½ x 6¾. Copy: The late Mr. Justice Baby.

1789.

32. Le | Juge à Paix | et | Officier de Paroisse | pour la Province de Québec. | Extrait de Richard Burn, Chancelier | du Diocèse de Carlisle, un des Juges à Paix | de Sa Majesté, pour les Comtés de Westmorland | & Cumberland. | Traduit par Jos. F. Perrault | A Montréal; | chez Fleury Mesplet, Imprimeur, rue Notre-Dame, | près les R.R. P.P. Récollets. | M.DCC.LXXXIX.

Size 5 x 8, pp. 561 x 15 = 576. Copies: Judge L. W. Sicotte and eight or nine others.

This book was issued in monthly parts of 32 pages each under the title of "Traduction de Burn's Justice." It was advertised in the Montreal Gazette of February, 1789, the first number as was announced appearing in March and the second on the 8th of April. The subscription was one shilling per part, which would bring the cost of the whole volume up to \$4.50. That is if it was divided in eighteen parts of 32 pages each. A list of subscribers is given in the Gazette which numbered over 237, of which 167 were from Montreal, 60 from Quebec, and ten from Three Rivers. In the library of the late Judge Baby are several unbound parts. Described by Gagnon, page 367, No. 2678, and by Dionne, page 14, No. 23.

1790.

34. Mémoire | abrégé | ou exposition justificative du cas de Jean-Baptiste | Lebrun, de la paroisse de St. Sulpice, dans district de Montréal | *On the last page is the imprint.* A Montréal; | chez Fleury Mesplet, Imprimeur, 1790.

Described by Dionne, page 15, No. 30. The copy in the library of Laval University is dated in manuscript, 1791.

1791.

35. La Bastille | Septentrionale, | ou | Les trois Sujets | Britanniques opprimés | Quod nequeo monstrare et Sentro tantum | Prix 40 sous | Se vend | A Montréal, | chez Fleury Mesplet, Imprimeur, | A Québec, | chez Mr. Bouthillier, au | Bureau de la Poste, | aux Trois Rivières, chez Mr. Mellish; à Varennes, chez Mr. Alexis Lahaye; à Berthier, chez Mr. L. Labadie; & à l'Assomption, chez Mr. Faubant, Notaire.

Size 5 x 8½, pp. 32. Copies: Université Laval, Quebec; Legislative Library, Quebec, and one or two others.

36. Mémoire | en cassation | du testament | de M. Simon Sanguinet, Ecuyer, Seigneur de | la Salle &c., Précédé du testament. | Montréal, 10 janvier 1791, | chez Fleury Mesplet | Imprimeur et Libraire, rue Notre-Dame 44.

Size 7 x 9, pp. 19. Copies: Cyrille Tessier, Quebec; Legislative Library, Quebec.

Described by Dionne, page 15, No. 3. A Factum prepared by J. F. Perrault.

1793.

37. By His Majesty's command | Auditor General's Office | June 1st, 1792. | Rules and regulations | for the | formations, field-Exercise | and

movements | of His Majesty's forces | Montreal | Printed by Fleury Mesplet
Notre Dame | street, No. 46, 1793.

Size $4\frac{1}{2}$ x $7\frac{1}{2}$, pp. XX x 100 x 54—174. Copy: The late Mr. Justice Baby.

NO DATE.

38. Mémoire | en réponse à l'écrit publié | Mr. Panet fondé de
procuration de Watson | & Rasleigh de Londres, Demandeurs, | contre Pierre
Ducalvet, de Montréal, Ecuyer, Défendeur | Stupete Gentes | A Montréal,
chez Fleury Mesplet, Imprimeur & Libraire.

Size 6 x 9, pp. 16. Copy: Cyrille Tessier, Quebec.

39. Engagement forms "pour le pays d'En'haut.

Quarto, pp. 2. Court House, Montreal.

B

List of Books, pamphlets, etc., printed by Mesplet including those mentioned in the inventories arranged according to subjects.

	No. of Copies in Existence.	No. of Copies in First In- ventory.	No. of Copies in Second In- ventory.
<i>Religious.</i>			
1 Règlement de la Confrérie 1st edition.....	2	—	—
2 “ “ 2nd “	20	—	—
3 Cantiques de Marseilles.....	5	350	1 paquet
4 St. Antoine de Padoue.....	1	740	—
5 Catéchisme pour Enfant.....	1	100	—
6 Neuvaine de St. François Xavier.....	3	500	8
7 L'Office de la Semaine Sainte.....	1	170	1 paquet
8 La Jeunesse Chrétienne.....	—	950	—
9 Psautiers (mentioned in Bulletin de R.H. vol. II, p. 108.)	—	324	65 2 paquets
10 Formulaires de prières.....	—	130	—
11 L'Ami des enfants.....	—	300	31
12 La Dévotion de la Ste, Famille.....	—	—	217
13 La Dévotion aux Saints Anges.....	—	100	72
14 L'ange Gardien.....	—	300	—
15 Règles de Paroisse.....	—	200	—
16 Petites Heures.....	—	—	4 paquets
17 Cathéchisme de la Valinière.....	—	—	25
18 Histoire Chantante de la Valinière.....	—	—	16
19 Catéchisme de la Confirmation.....	—	—	18
20 Messe de Ste. Famille.....	—	—	3 paquets
21 Sermon Funèbre, B. Frobisher.....	2	—	—
<i>In Iroquois.</i>			
22 Iroquois Primer (prières sauvages 1777.....	1	—	16
23 A Primer for the Mohawk Children 1781.....	3	—	—
<i>In Latin.</i>			
24 Officium in honorem.....	5	—	—
25 Alphabet Latin.....	—	100	1 paquet
26 Nouvelle Méthode pour Latin.....	—	—	8
27 Lettres de Cicéron en Latin.....	—	—	31
28 Phedre en Latin.....	—	—	10
<i>School Books.</i>			
29 Alphabet français.....	—	500	65
30 A.B.C. “	—	—	2 rames
31 English Spelling books.....	—	—	3 paquets
32 Livres d'école Anglais.....	—	—	1 lot
<i>Literary.</i>			
33 Inoculation du bon sens 1775.....	1	—	6
34 Les Gants Anecdotes 1775—Hildeburn vol. II, p. 221.	—	—	—
35 Jonatases David, 1776.....	3	—	12
36 Dialogues Curieux et intéressants.....	—	—	21
37 Anecdotes Anglaises et françaises.....	—	47	70
38 Abrégé de la Versification française.....	2	—	35
39 Ecu de six Francs.....	3	100	—
40 Sentences.....	—	—	1 paquet
41 Brochures.....	—	—	2 lots

	No. of Copies in Existence.	No. of Copies in First In- ventory.	No. of Copies in Second In- ventory.
<i>Legal and Political.</i>			
42 Lettre aux Habitants, de Quebec 1774.....	2	—	—
43 " " " opprimé " 1775.....	1	—	—
44 " " " du Canada " 1776.....	2	—	—
45 Memorial to Members of Congress, 1783.....	1	—	—
46 Articles de la Paix.....	1	—	—
47 Le Juge à Paix.....	10	—	155 3 paquets
48 Mémoire de Mézière... Dames Religieuses de Trois Rivières. Advertised in Gazette of 1779.....	—	—	—
49 Réponse à par F. L. Duèrne..... do	—	—	—
50 Mémoire sur le testament Sanguinet.....	1	—	—
51 " de Panet.....	1	—	—
52 " de J. B. Lebrun.....	1	—	—
53 La Constitution Droit de l'homme.....	—	—	23
<i>Military.</i>			
54 Règlement Militaire, 1775.....	1	—	—
55 Manual Exercise.....	1	—	—
56 La Bastille Septentrionale.....	3	—	145
57 Rules and Regulations for Field Exercise.....	1	—	12
58 Discipline Militaire.....	—	—	1 paquet
<i>Medical.</i>			
59 Maladie Contagieuses de la Baie St. Paul.....	2	—	—
<i>Newspapers.</i>			
60 La Gazette Littéraire.....	2	—	—
61 La Gazette de Montréal, 8 Vols.....	5 vols.	—	10 vols.
<i>Historical.</i>			
62 La Louisiane Ensanglantée.....	2	—	—
63 Journal du Voyage de Lacorne St. Luc.....	2	—	—
<i>Almanacs and Calendars.</i>			
64 Almanach Encyclopédique 1777.....	1	—	—
65 " Curieux et interessant 1778.....	2	—	—
66 " " " 1779.....	1	—	—
67 " " " 1783—Mentioned by Dionne.....	—	—	—
68 " " " 1784.....	1	—	—
69 Calendriers 1789—Advertised in Gazette.....	—	—	—
70 " 1794.....	—	—	12
71 " perpetuel.....	—	—	1 paquet
<i>Miscellaneous.</i>			
72 Règles pour change de Monnaie.....	—	200	—
73 Easy rules for exchange of currency.....	—	—	300 doz.
74 Guide de la Banque Anglaise.....	—	—	1 paquet
75 Tableau des Rues et Faubourgs de Montréal.....	—	—	1 paquet
76 Lettres Circulaires.....	—	—	1 paquet
77 Engagement pour Voyage d'enhaut.....	large number	—	1 paquet

C No. 1.

FROM THE HALDIMAND COLLECTION.

Canadian Archives, Series B, Vol. 185, Pt. I, p. 66.

M^r Mesplet Maitre Imprimerie a Quebec.

Philadelphia 29 Mars 1775

Monsieur

J'ai appris y^r de madame votre epouse quel avez Reçu de vos nouvelles, et bien fâché que vous aier été malade dans votre route et que vous avée eut beaucoup de peine et d'inquiétude; Je vous Repons que vous en avez laissé a M^r votre Epouse, ainsi qu'a moi, d'e n'avoir point disous votre société avec votre assotée avant votre depart ou d'arranger autrement vos affaires attendu qu'il a voulu faire saisir toutes vos effets que vous avez chez vous, J'ai été obligé de les faire enlevé et de les cachées en different endroits, ainsi que vos caracteres qui estoit chez monsieur Miller par le consentement de madame votre epouse. Le tout est en votre disposition ainsi qu'a la Sienné. De plus madame Votre epouse m'a dit que vous lui marqués de voir M^r Miller ainsi que moi et de nous priés d'avoir quelque consideration pour vous Je suis surpris de cela de votre part a mon egard, Je ne crois point ne vous avoir des obligée en aucune chose ou vous n'avez pas fait reflexion sur ce que vous aié dit a votre depart de Philadelphia Vous n'avez aucune precaution a prendre au Sujet de ce que vous devée a Mr Miller attendu que j'ai payée et retirée tous vos caracteres de chez lui et vous n'avez appressent a faire qu'a moi sur plusieurs articles; premierelement 52 pounds et 4 Shillings plus le Lendemain de votre depart £3 0 0 comme Je l'avait promise. Le 11 Mars payée pour une quartier de votre maison a Mr Benezst £10 10 0 monsieur Miller £66 0 0 payée le 23 du même mois Total £131 14 0

Le tout ne depent que de vous d'arrangée vos affaires le plus aven- tageuse qu'il vous sera possible. Le tems le plus cour sera le millieur pour vous et marqués moi comme vous aurez fait et au cās que vous ne pouviez pas trouvez personne pour vous avensée et que l'on voudra vous mettre dans le cas de travailler pour eux Engagé vous pour venir a Philadelphia Je feré honneur a vos engagements ou faite moi le savoir pour vous envoyer votre imprimerie qu'el ne tiens a rien ainsi que Madame. Je vous envoie la reconnaissance des effets que j'ai en main savoir 9 caisse ou ballots marqués F. M. Renfermente votre imprimerie et j'ai laissé le No: 13 et 17. dans la chambre de M^{de} Retirée de chez M^r Miller imprimeur item 2 paniers un grand et un petit contenant des caracteres marqués F. M. No: 1. et 17. 4 caisses a ditto marqués de même No: 3. 4. 6. 8 cela vous sert a recon- naissance Je viens de recevoir une lettre de mon correspondant de St. Dominque et me marque que des bonnes nouvelles et que toutes mes envoies sont Rendu au mole de St. Micholas en tres bons port et il me prie de lui faire Savoir la reponse des Messieurs du Canada au Sujet de la lettre du Congrès (que vous avez imprimé) touchant les affaires de la Nouvelle Angleterre; comme Je Sais que vous etes dans le cās de voir tout ce qui est de mieux en Canada et que vous verrez ce qu'il vous diront a ce Sujet Vous avée l'esprist monsieur assez pénétrant pour conserver ce qu'ils veulent

dire ou ce qu'il pence Je vous saurée obligée Monsieur de me donnez une copy sur une feuille vollante sans signé Seulement que le date et le plutot qu'il vous sera possible. Je n'ai aucune bonne nouvelle a vous apprendre Sinon que madame votre epouse est en bonne santé ainsi que celui qui a le plaisir de vous Soier toutes bonnes reüsite dans tout ce que vous pouvez entreprendre et Soier persuadée que je sauré toujours monsieur Votre tres humble et tres obeissant Serviteur

BERGÉ

Mon adresse est chez Peter Parir, Race Street in the corner of second St. Philadelphia

Endorsed, Letter to Mesplet from Philadelphia of 29th March 1775. which clearly Shows his first errand into the province.

Monsieur

Monsieur Mesplet imprimeur Present a Quebec En Canada

No. 2.

Montreal, le 24 fevrier 1778.

Monsieur,

Comme vous n'ignorée pas les viersitudes de la vie puisque vous les avée éprouvées en differents tems par les coups que vos ennemis ont voulus vous porter vous vous en etes preservés Jusqu'a ce jour et Je Souhaite que vous les pariés de nouveau car les ennimis cherchent tant par eux meme que par leur influence auprés des grands de vous faire tout le tort possible, ils exercent les faux temoignages l'irrelégion et l'imhumanité. L'on vous previent de vous tenir sur des sages gardes dans un tems d'orage ou la jalousie et la calomnie de vos adversaires est inexprimable. J'ay été a même d'entendre le fiel et le venin qu'ils ont contre vous ils vous dechirent et voudrait vous aneantir s'ils le pourrait. Sur les soupçons que l'on dit que vous etes de l'opinion de colonies unies; Voila le crime dont vous etes accusé; fondez sur la tranquillité que vous avée gardées dans ces tristes affaires, L'on a fait tout ce que l'on a pu aupres de General Charlton pour vous faire de la peine, mais son esprit tranquille et humain a fait qu'il n'a rien fait. Cependant comme le tems n'est point encore calme et que l'oragan du Sud peut se faire sentir L'on vous previent afin que le moindre qu'il parait que vous soyez pret a recevoir la garde que l'on

se propose de vous donner non de jour main de nuit pour aller plus de Sureté a quebec. Cici pour avis vous n'êtes pas le Seul mais il y en a bien d'autres des quels on se propose de jouir en tems et sans vous connaître Ceux qui vous donnent cet avis ainsi que le nom des Commissaires Marchands et autres qui sont les plus a charnis contre vous dans ces affaires; Je suis bien Sincerement

Monsieur

Votre tres humble etc

pacis Amicus tranquillit—atisque neque vexationis et insectationis.

No. 3.

A Son Excellence, Guy Carleton Chevalier du très honorable Ordre du Bain
Capitaine General et Gouverneur en Chef de la Province de Quebec
etc. etc. etc.

Monsieur

Encouragé par la plus saine partie des citoyens de cette ville dans le projet d'establissement d'un papier public Je prends la liberté de demander a Votre Excellence son approbation persuadé qu'elle voudra bien ne pas refuser a ce qui peut etre à l'avantage public et particulier. Restraint aux differents avis que les negocians et autres voudront y inserer aux affaires du commerce et a la littérature, J'aurai soin d'ecarter tout ce qui pourrait porter le moindre ombrage au gouvernement et a la religion. Il n'y sera meme fait aucune mention des affaires presente.

Votre Excellence m'accordant ce Previlige honorera le public d'un nouveau bienfait et ajoutera s'il est possible a la sincere gratitude et au profond respect avec lequel Je suis Monseigneur de Votre Excellence Votre Très humble et obeissant Serviteur

FLEURY MESPLET

Imprimeur

Endorsed From Fleury the imprimeur at Montreal requesting permission to publish a paper weekly.

Memorial of Mesplet the Printer requesting permission to publish a news paper

No. 4.

AUX CITOYENS DE LA VILLE ET DISTRICT DE MONTREAL

Messieurs,

L'establissement d'un papier Périodique m'a paru, ainsi qu'à plusieurs, un projet qui, mérite votre attention à tous égards. Par ce moyen, on facilitera le commerce, on multipliera les correspondances, on excitera ou on entretiendra une emulation toujours avantageuse. Le Citoyen communiquera plus promptement et plus eclairement ses idées; De là le progrès des Arts en général et un acheminement à l'union entre les individus. Il résulte plusieurs autres avantages pour la société lesquels vous sentez mieux que Je ne les pourrais exprimer, et dont l'énumération seroit hors de place. Les avantages ne sont pas moindres eu égard aux intérêts particuliers; La facilité d'avertir en tout temps le public des ventes de Marchandises, Meubles ou bien-fonds, de retrouver des effets qu'on croit perdus, et rattraper les negres fuyards; d'annoncer le besoin qu'on peut avoir d'un commis ou d'un domestique et plusieurs autres que la commodité qu'offre ce projet developpera. Je me propose de remplir la feuille des avertissements publics des affaires qui pourront interesser le commerce a quoi on ajoutera quelques morceaux variés de Littérature. J'ose me flatter que, si comme J'espere vous encouragerez ce foible commencement Vous Verrez messieurs, avec plaisir, et dans peu non seulement une Collection d'Avis et annonces, mais encore un recueil amusant et instructif. Je ferai mon possible pour procurer des pieces nouvelles, et Je ne doute pas que ce ne reveille le génie

de plusieurs, qui, ou sont restés oisifs ou n'ont pas communiqué leurs productions n'ayant pu le faire sans le secours de la presse

J'insérerai dans le susdit Papier ou Gazette tout ce qu'il plaira à un ou plusieurs me communiquer pourvu qu'il ne soit fait mention de la Religion du Gouvernement ou de nouvelles touchant les affaires presentes; à moins que Je ne fus autorisé du Gouvernement mon intention etant de me restreindre dans ce qui regarde les Avertissements, affaires de commerce, et de Litterature. Supposé que le titre de Bureau d'Avis ou Gazette de commerce et litteraire que Je me propose de donner a ce papier Periodique soit trouvé par quelqu'un ne pas convenir je recevrai le conseil que l'on me donnera a cé sujet. De meme s'il y avait quelque objection a faire sur les conditions suivantes on pourra les proposer.

CONDITIONS.

La Souscription sera de deux piastres et demie, d'Espagne, par L'année. Les souscriptions ne payeront qu'une piastre d'Espagne par chaque advertissement pour trois semaines de suites.

Ceux qui n'auront pas souscrit payeront une demie piastre de plus par chaque avertissement. Il sera libre a chaqu'un qui n'aura pas souscrit de se procurer ledit papier en payment dix copres au detail Ledit Papier sera imprimé sur le format in quarto et paraîtra tous les Mercredis a commencer le .

Les personnes qui voudront souscrire sont priées d'envoyer leur nom et leur adresse; J'ai l'honneur d'etre avec un desir sincere de contribuer autant qu'il est en mon pouvoir a l'avantage et a la satisfaction Publique, Monsieur,

Votre tres humble et tres obeissant serviteur

FLEURY MESPLET

Imprimeur

No. 5.

Vol. 80, page 2.

Quebec 25th June 1778.

Sir,

I herewith enclose the orders of the 24th Inst. His Excellency is desirous to know whether the Printer concerning whom. you was wrote to some posts ago, has received the order you was directed to communicate to him for his quitting for the province His name I did not then mention the General not recollecting it. His name is Mesplot.

General Haldimand was at Bic in the Montreal frigate on Sunday last, and is hourly expected.

I have the honor &ca

BRI^{re} GEN^l POWELL

No. 6.

Vol. 80, page 2.

Quebec, 29th June 1778.

Sir,

Your Letter of 25th Instant. addressed to Sir, Guy Carleton, was by his directions placed before me,
 the man employed by Mr Mesplat, is no doubt concerned or acquainted with the tenor of his masters conduct, the same order is to extend to him, and it is expected they both leave the province on or before the fifteenth day of September next.

I am Sir &ca

S. FRED^K HALDIMAND

B. G. POWELL

No. 7.

A Son Excellence Guy Carleton Chevalier de tres honorable ordre du Bain
 Capitaine General et Gouverneur en chef de la Province de Quebec
 General et Commandant en chef des forces de Sa Majesté dans laditte
 Province et Frontieres d'icelle etc.

Nous Soussignés, Citoyens de Montreal representons humblement a
 Votre Excellence la mortification que nous cause le depart de sieur Fleury
 Mesplet Imprimeur de Cette Ville l'ordre a lui donné verbalement par le
 General P * * * de Vuider la Province Sous trois mois nous a Surpris; la
 conduite qu'il a tenu depuis son arrivé en ce pays la regularité de ses
 mœurs parassait nous assurer de le conserver plus long temps et devoir
 le mettre a l'abri d'une telle disgrâce. S'il est des raisons d'Etat qui ne
 soient parvenues a notre connaissance nous ne disons riens; mais il est
 notre Concitoyen, Continuellement sous nos yeux nous sommes temoins de
 toutes ses demarches et nous ne scaurions lui faire aucun reproche son zele
 pour procurer de l'instruction et de l'amusement en donnant un papier
 periodique nous marque un bon patriote La loi qu'il s'est imposé de ne
 traiter de matieres qui ne regardent ni l'Etat ni la religion nous
 prouve sa delicatesse nous n'y voyons que des Instructions pour le jeunes
 gens et du plaisir pour tous. Nous supplions Votre Excellence d'avoir egard
 a notre tres humble representation et d'etre persuadé que si Fleury Mesplet
 eut a notre connaissance donné lieu a cette traitement nous regretterions a
 la verité un homme aussi utile mais n'envisageant pas l'utilité et agrement
 que peut nous procurer la presse nous nous trairions. Que n'aurions-nous
 pas a reprocher, Si un de nos Citoyens souffrait une exportation onéreuse
 faite par nous de ne par rendre hommage a la Verité—Longueuil, P. Vallé,
 Dumaz, Lacroix Neveu Sevestre, St. Ours, D. Carignan, Meziere, St George
 Dupré, I. G. Pillet, foucher, Perinault, Jn. Delisle, Lambert St Omer
 Lemoine, Jn. Berret, Londireaux, Jn. Vienne Fs. Le Guay Bomer Lafon-
 taine C. Latour Bonnefois, Larthigue.

Endorsed The memorial of Sundry French gentlemen of Montreal in
 favour of F. Mesplet the printer.

Augst 177

No. 8.

Montreal the 24th August 1778.

WHEREAS an order has been given to F Mesplet Printer, lately settled in Montreal, and all such persons as were with him concerned forbidding him and them to Exercise the trade of Printing, and directing that he and they should, before the 15th day of September next Ensuing Quit the Province, But several respectable persons of the said place having since appeared to the character of the said F. Mesplet and he become responsible for his good conduct in future, His Excellency the Commander in Chief is therefore induced to suspend for the present, the above said order, and hereby permits the said F. Mesplet to carry on his business of Printing, or any other lawfull occupation, on condition that he & his associates take the oaths of Allegiance before His Majesty's Honorable Judge of the Court of Common Pleas of this place within two days from the date hereof, a Certificate whereof He must produce to the Commanding Officer of the Troops in the District. And that he submit without fail or reserve whatever he shall print or cause to be printed during the present Rebellion of the Neighbouring Colonies, to the inspection of such person as by His Excellency shall be appointed for that purpose, and that he on no account pretend to print any thing which shall not first be so inspected, nor anything which such inspection shall signify his disapprobation of upon pain of having the aforesaid order for him the said F. Musplet Printer, to quit the Province put immediately in force, which order is to be by him considered as not revoked, only suspended, but nevertheless as long as he shall demean himself Soberly and as a good Subject of His Majesty to be of no effect whatsoever, This order to remain in the hands of Brigr Powell, or officer Commanding for the time being in Montreal.

By His Excellency's Command

(Signed) E. F.

No. 9.

Sorei the 23th September 1778.

Mr. Cramahé

Sir,

Your letters of the 21st and 24th are received

I have observed several improper things published in our Gazette, particularly in the last, an account of Associations in Ireland, which I think at these times ought not to be published. I must beg therefore that some step be taken to prevent it in future, as Mr Gordon is gone to England somebody should be appointed in his room to inspect the Paper....

I am Sir, &c., &c.

(Signed) F. H.

No. 10.

Canadian Archives, Series B, Vol. 95, p. 53.

CRAMAHE TO HALDIMAND.

I received your Letter 28th Sept^r1st Oct^r 1778.

Our Printer has some Penchant to the popular cause, and when he gets a cup too much, which is not seldom, his zeal increases. I have cautioned him two or three times since your Departure, and shall, until you can find a proper Person to inspect his Press, desire him to lay before me whatever he intends to publish.

It was too late to insert any extracts of the Rebel newspaper & written accounts lately transmitted, in this Day's Gazette, they will do for next week, besides the contents of the paper, there are strong Reports of the Disagreement between the new Allies about this Town & particulars related, tho' there is no tracing whence they originate.

No. 11.

Canadian Archives, Series B, Vol. 185, Pt. I, p. 79.

Monsieur,

Montreal, 4 Jan^r 1779.

Je me vois obligé de vous importuner des persecutions que j'essuie de différentes personnes au sujet de mon papiers periodique, telles persecutions que j'ai pris pour me mettre a l'abri je n'ai pas réussi.

Le pere Well, Jesuite, sous le nom de l'anonyme, a donné plusieurs productions que j'ai mis par complaisance dans la feuille, j'ai reçu tant de reproche que j'ai été obligé de refuser de nouvelles *je vous envoie copie d'une*, dont j'ai crû à propos de ne pas exposer au public *a tous égards*. M^r Montgotfrier paraît prendre partie pour le pere Well et en conséquence m'a fait des reproches tres vifs et m'a menacé d'ecrire a son excellence pour m'en défendre la continuation; qu'il est disgracieux pour moi d'avoir tant d'ennemis sans sujet. Mon papier est Sous vos yeux je n'ai rien touché qui regarde le gouvernement et je peux dire avec verité que ces messieurs seuls cherchent a me nuire; J'espere monsieur qu'il vous plaira prevenir son excellence et que vous voudrez bien opposer à leur petit tyrannie les sentiments nobles et equitables qu'il vous a plu me temoigner. j'ai l'honneur d'etre avec respect Monsieur, Votre tres humble et tres obeissant Serviteur

FLEURY MESPLET

No. 12.

Copie d'une production du Pere Well, Jésuite, signée l'anonymie qui m'a été présentée pour la premiere fois en presence de M^r de St. Luc La Corne.

En parlant du jeu des echecs

CHANSON.

1

Sur le jeu que j'ai dans les mains,
Le sort n'étend pas ses caprices;
Ce sort qui, parmi, les humains,
Couronne si souvent les vices.
Combien d'hommes aux premiers rangs
Que le seul hasard a fait grands.

2

Les Rois ont des fous pour Soldats,
qui les servent dans chaque armée;
Messieurs ne vous en plaignez pas,
Puisque dans plus d'une assemblée,
Les hommes seraient bien heureux.
de n'en pouvoir compter que deux.

3

Les fous sont placés près du Roi,
un tel roi peut-il être Sage?
Des courtisans quand je les voi,
je reconnais ici l'image.
jamais s'il s'agit d'un bon choix,
De deux Sots n'écoutez pas la voix.

4

Le chevalier change Souvent
De couleur et de contenance:
Dans son bizarre changement,
reconnaissons notre inconstance:
A tous moments, sans le scavoir,
Nous passons tous du blanc au noir.

5

Le Roi fait un pas chaque fois,
jamais il n'en fait d'avantage.
pour notre bonheur tous les Rois
devraient suivre un pareil usage.
quand on gouverne les Etats,
on doit s'avancer pas à pas.

6

Vous avez pris un de mes pions,
Et moi je vais prendre un des vôtres.
Tous ce qu'aux autres nous faisons,
Nous devons l'attendre des autres:
Quand piece à quelqu'un l'on fera,
Pièce pour pièce il nous jouera.

7

Je ne sçais pour quelle raison
Le Roi n'est pas avec la Reine,
Tandis qu'il garde la maison
Madame court la pretentaine....
Echec et mat!.... il doit souffrir;
Pourquoi laisser Sexe courrir?

Endorsed Mr Mesplet the Printer Jan 4th 1779.

No. 13.

Canadian Archives, Series B, Vol. 66, Pt. 1, p. 102.

Copie

Monsieur,

Quebec 15^e fevrier 1779.

J'ai reçu dans son temps l'honneur de votre Lettre du 2^e Janvier, & je vous dois Monsieur bien des excuses pour avoir tardé aussi longtemps à y Repondre, mais outre des occupations pressentes, l'affaire en question méritoit d'être bien réfléchi.

Dans le principe je m'étois proposer d'arreter tout à fait immédiatement la Prise du Sieur Miplet dont l'abord dans cette Province, méritoit plutôt chatiment qu'un accueil favorable, mais vous savez Monsr les sollicitations qu'on me fit à Montreal pour m'engager à lui permettre d'y rester.

Pour l'empêcher de tomber davantage dans un travers ou il paroît fort incliner, & jusques à ce que je puisse prendre d'autre Mesures; je lui ay fait défendre très expressément d'attaquer la Religion ou le Clergé; de ne rien inserer dans sa feuille qui put choquer les bonnes moeurs, ou fomenter la discorde parmi les Peuples qui par toutes sortes de raisons devroient soutenir les Interets d'un Gouvernement qui les a Protégé & sous les auspices duquel la Province s'est améliorée beaucoup audela de ce quelle avoit jamais fait auparavant.

Comme je connois votre Zèle & l'attachement que vous avez pour ce même Gouvernement; & que j'ai une parfaite confiance en votre Prudence & Discretion. Je vous prie Monsr de veiller de près aux publications de cet Imprimeur et de m'avertir au plutot s'il lui arrive encore de s'ecarter de la Conduite qui lui a été prescrite de ma part.

Monseigneur l'Evêque je suis persuadé vous aura fait part des demarches que j'ai faites à l'Egard du Père Wells, & les avis que j'ai donné aux Révérends Peres Jesuites. J'espere que ces Messieurs ne donneront plus prise sur Eux & que j'aurai à L'avenir tout lieu d'être content de Leur Conduite.

J'ai l'honneur d'être avec la plus parfaite Estime

Monsieur, Votre &c.

(Signé) F. H.

A Mons: de Mont Golfier

Endorsed Copy Letter from His Excellency Genl Haldimand to M. de Mont Golfier Superior of the Seminary of St. Sulpice at Montreal dated Quebec the 15th February 1779.

No. 14.

Monsieur:—

Par la lettre que j'ai reçue de M. Cramahé de la part de Ve Excellence et que dans son temps j'ai communiqué à M. Southouse, mon Collègue, nous avons non seulement été patient comme nous en estions requis de la part de Ve Excellence, mais nous avons été sourds à bien des dits cours de la part de L'imprimeur de Jottard qui tendoient à nous insulter.

Nous croyons Monsieur que cet Imprimeur et Jottard et le Sieur du Calvet mettent le comble à la mesure et se croient en droit de nous insulter et de braver le Gouvernement, sous la Protection duquel nous avons l'honneur d'exerter, et d'exerter de notre mieux.

Comme officiers de ce Gouvernement nous croions faire ce qui est en notre pouvoir pour rendre la justice au sujets du Roy, et qu'il appartient au Gouvernement seul de s'enquerir de notre Conduite et juge si les reproches et réflexions proposés contre nous sont justes ou calomnieuses. Votre Excellence jugera par la Gatte ci-incluse la conduite des auteurs qui y sont souscrits est tollerable ou si elle merite d'etre reprimée.

Ve Excellence le croiroit à peine que Jottard et Mesplet ont eu l'audace de se presenter aujourd'hui à la chambre d'audience dans la vüe sans doute de prouver à la populace qu'ils n'avoient rien à craindre, et que l'on pouvoit sans danger insulter les magistrats; ou à dessein de nous provoquer à leur dire quelque chose qui peut marquer de la passion afin de s'en prevaloir.

Notre façon de penser tout à fait opposer à aucune mesure violente nous a fait ne prendre aucune attention à leur presence, nous esperons que Ve Excellence se determinera à prendre un parti à l'Egard des desportements de ces homes insolents.

.....

Je signe cette lettre pour M. Southouse et moy, &c &c

H. ROUVILLE

Endorsed From Judge Rouville, of 27th May 1779.

No. 15.

Canadian Archives, Series B, Vol. 185-1, p. 90.

Quebec 1st June 1779.

Monsieur

J'ai reçu votre lettre du 27 mai avec la Gazette dont vous faites mention J'avais eu des Raisons pour temporiser et ne pas aller trop vite avec Besogne avec des Gens dont les dispositions sont trop long tems connues pour douter un seul moment qu'ils n'ayent le dessein ferme de diffamer tous le officiers du Roi et de jeter toute la colonie dans une confusion toujours a souhaiter pour des gens qui ne sçavent ou donner la tête.

Je vous prie d'être assuré vous même et d'assurer Monsieur Southouse qu'en toutes les occasions je me ferai un veritable devoir et plaisir de soutenir les officiers du Roi surtout quand ils agissent avec la moderation que vous avez montrée en cette occasion et qui est de toutes manières louable En recevant ma lettre vous apprendré la maniere dont je m'y suis pris pour arreter le cours des insolences des sieurs Jautard et Mesplet Je souhaite de tout mon coeur que cet exemple ait l'effet sur les esprits qui, on en doit desirer qu'il confirme aux ceux qui sont bien disposés, ramene les chancelans et donne une juste terreur aux Mal Intentionés, Envers un gouvernement dont le plus grand défaut a peut etre été d'avoir trop de douceur.

Quoique que cette lettre vous soit adressée en particulier mon intention est qu'elle sert aussi à votre collègue M^r Sanhouse a qui vous aurés la bonté de la communiquer

J'ai l'honneur.

Endorsed To M^r Rouville 1st June 1779.

No. 16.

Canadian Archives, Series B, Vol. 185, Pt. 1, p. 87.

By His Excellency Frederick

Whereas I have received sundry information of the traiterous practices of Valentine Jautard formerly attorney and of Francis Mesplet, Printer at Montreal, This is to authorize and impower you to seize and secure the said Jautard and Mesplet for the said traiterous practices to confine them seperately, you are not to suffer them during their confinement on shore or on board to converse together or with any other Persons and will send them down here by first favorable opportunity to the custody of the Military provost at this place. You are likewise directed to seize and secure at the same time. all papers in the possession of the said Jautard and Mesplet, and in the presence of any two commissioners of Peace not being any of those they are at variance with, or any two honest Members of Society you can conveniently assemble for that purpose, you are to seal up their papers seperately, commit them to the care of some trusty person, and cause them to be conveyed down here by the first favorable opportunity under the custody likewise of some one you can trust. You will cause the printing Presse, Types, and every article thereunto belonging to be valued by honest and impartial people an inventory to be made thereon, and deposited in a safe place until disposed of as may hereafter be directed You will let Jautard and Mesplet have their Clothes, apparel and money and commit the care of their furniture to such Persons as they may chose to Appoint.

And for the execution of all that is herein directed this will be to you and all concerned a sufficient warrant and authority

Given under my hand and seal at Quebec, this 1st June 1779.

To Major John Nairn Commanding at Montreal

Endorsed Warrant for arresting Valentine Jautard and Fleury Mesplet
1st June 1779.

No. 17.

Canadian Archives, Series B, Vol. 185, Pt. 1, p. 92.

Quebec, June 1st 1779.

Sir

You will herewith receive a warrnant under my hand and seal for apprehending and securing Jautard and Mesplet whose behaviour has long been obnoxious to Gouvernement and who of late seem to bid defiance to all law and Justice, it is a disagreeable piece of business but at this time indispensably necessary.

After the receipt of my letter and warrant You will keep the matter secret till you have taken the proper measures for executing the same with precision; you are to take care they do not escape you, and endeavour to make sure of all their papers, at the same time you will see, that they are treated with humanity be furnished with good provisions and have such conveniences as can be procured them. While in confinement on shore, or on board you will direct that the prisoners are not permitted to communicate together or with persons from without and that they be not allowed the use of pen Ink or paper. If any of the Treasury Brigs are still at Montreal you will order one of them to carry down the prisoners or send them by the first vessels that sail from there taking care they are kept seperately and to be guarded by such as you can entirely confide in.

When the Prisoners have been secured you will deliver the enclosed to Mr Rouville; I need not recommend to you, whose good sense and attention to the King's service I have the most perfect confidence in, to observe the effects this measure has upon the King's subjects of every denomination and their movements in general in times so critical and dangerous as the present are

I am &c.

Endorsed To Major Nairn 1st June 1779.

No. 18.

Canadian Archives, Series B, Vol. 185, Pt. 1, p. 89.

Quebec, 1st June 1779.

To Major Nairn;

Sir,

In case you not yet sent away the two Dilinquents you will receive orders by an express dispatched this day to arrest them; you are to put them on board the Provincial armed schooner Mercury that sails this day for the purpose the commanding officer thereof has Directions to obey you should they come away before she reaches Montreal you will detain her as short a time as possible and order the officer to return to this port.

Endorsed To Major Nairn 1st June 1779.

No. 19.

Canadian Archives, Series B, Vol. 185, Pt. 1, p. 94.

You are hereby ordered and directed to proceed without loss of time with the Provincial schooner Mercury under your command, to Montreal; should you find when you arrive at the Foot of the Rapids of St Mary's near Montreal that the Wind is contrary you are to cast Anchor there and proceed by land to Montreal to deliver my despatches to the officer commanding there, whose orders you are to obey without delay; you will keep an exact journal of all occurrences in your passage up as well as down.

Given under my hand at Quebec 1st June 1779.

Endorsed To Wm Halcro Esqre Commd His Majesty's Provl Armed Schooner Mercury 1779.

To the Master of the provincial Armed schooner Mercury June 1st 1779.

No. 20.

Canadian Archives, Series B, Vol. 161, p. 18.

NAIRNE TO HALDIMAND.

Sir:—

Montreal, 6th June, 1779.

I had the honour of receiving Your Excellency's letter and orders in regard to Jautard and Mesplet, which I put in execution on Friday morning. They made no resistance but submitted quietly and this morning I sent them on board a Vessel for Sorrell, in charge of Lieut Mackinnon and a Guard of a Corporal and four men. There is no Vessel here that goes directly to Quebec, but I hope there may be one at Sorrell, and have given Mr Mackenzie instructions conform to those I had from Your Excellency.

I have ordered the printing Types to be put up and so soon as that can be done properly shall make an Inventory and deposit them in a safe place till Your Excellency's further pleasure is known, for I have not yet been able to find any person who can value them except Mesplet himself, and it is very difficult to assort them properly.

I don't find that the Prisoners have many Friends here, nor that the steps taken in regard to them have given any great Alarm. I shall however be attentive to what passes and will not fail to report to Your Excellency everything I think worthy of your notice.

All the papers belonging to the prisoners are put up in two separate bundles and sent in charge of Lieut. Mackinnon.

I have the honour to be Your Excellency's most obedient and most humble servant.

His Excellency General Haldimand.

JOHN NAIRNE

Major

Endorsed—A. 1779: From Major Nairn at Montreal of 6th June Recd 9th.

No. 21.

Canadian Archives, Series B, No. 54, p. 85.

Extract letter of Haldimand to Germain,

Quebec, 7th June 1779.

The Turbulent & seditious Behaviour of a Cabal at Montreal, has also laid me under the necessity of confining Two Frenchmen there, who names Mesplet & Jaubard, the former a Printer sent here by Congress in 1774, to Publish and Disperse their letters, the latter has been an attorney & is an unprincipled Adventurer. So soon as their Papers have been examined Your Lordship shall have a circumstantial Account of their affairs, & if this does not in some measure check the Licentious Spirit that was beginning to rise, I shall not hesitate to make more examples, I heartily lament that those who misbehaved in 1775 and 1776 were not severely punished, it was easy then, but now difficult, nevertheless my Endeavours shall not be wanting to promote the King's interests, serve the Public and secure the Province. Objects which engross all my attention and which always have been and ever shall be the sole aim of all my actions.

No. 22.

Canadian Archives, Series B, Vol. 185, Pt. 1, p. 95.

A Son Excellence, le tres honnorable Gouver. Général de Quebec et Dependances etc etc etc.

Monsieur,

Supplie, tres humblement, Marie Mirabeau epouse de Fleury Mesplet, Imprimeur de Montreal, Detenu en Prisons de cette ville. S'il est disgracieux pour moy d'étré obligée d'importuner Son Excellence Il est encore bien plus douloureux d'avoir un juste motif de le faire Le triste état ou me reduit la detention de mon mari ne me permet de me taire plus long tems, la perspective est trop effrayante pour ne pas m'epouvanter sans secours ni fortune pour ainsi dire étrangère dans ce pays je n'avais de ressource que dans son Industrie Devient inutile par sa detention. Je connois la quantité et la qualité de ses ennemis mais Je serai assez discrete pour les taire; leur efforts reitérés ont produit le funeste effet qu'ils en attendaient Il a succombé sous le poids de l'envie et de la jalousie

S'il étoit coupable j'irais aux pieds de Votre Excellence implorer sa bonté et demander des graces, mais certaine de son Innocence Je demande un act de justice; que ces papiers soient inspectés, qu'il soit même fait une regulière de sa conduite et de ses moeurs. Je ne doute pas que sous peu de jours le jugement qui inteviendra luy sera favorable et que je possederay un second moy même qui m'est encore plus char parce qu'il est mon epoux et que mon bien etre depend de lui. Je me flatte que Son Excellence fera droit a ma humble Representation et que son equité s'opposera a ce que sous ses yeux on immole (pour ainsi dire) la fortune de quelques particuliers a la jalousie et l'ambition de quelqu'autres: Je continueray (car je ne peux rien ajouter) aux voux sinceres que je fais pour la prosperité de Son Excellence

Petition of Madame Mesplet, 15th July 1779. Her Husband being a State prisoner, praying for examination

No. 23.

Canadian Archives, Series B, Vol. 185, Pt. 1, p. 97.

A Son Excellence, Frederick Haldimand, Gouverneur en chef de la Province de Quebec etc. etc. etc.

Fleurý Mesplet, prisonnier a l'honneur de représenter a Votre Excellence, qu'il a été arrêté par ses ordres le 4 juin 1779, et que depuis ce tems il a été reservé si strictement pendant les premiers mois de sa detention qu'il ne luy fut pas possible de faire parvenir ses plaintes a Votre Excellence; L'hiver s'ecoula dans une triste position mais il luy restait encore la consolation de croire que l'arrivée des batiments mettrait fin a sa peine. On lui repaissait l'imagination de cet espoir qui calmait un peu son chagrin encore lui restait-il alors quelque petit moyen de subsister.

Toutes ses esperances sont évanouies, les batiments sont arrivés, ses Moyens épuisés, sa santé alterée son epouse seule dans un pays qui lui est inconnu sans parens sans amis sans bien et sur le point d'être reduite dans l'etat le plus critique; ces tristes considerations on affaibli la resolution que son innocence lui inspirait il a recours a l'autorité et a l'equité

Since the Delivery of the new Mohawk prayer Book the Indians in general have, on Acct of its being corrected given themselves much pain to study it and I in order to encourage their zeal have nominated a Clerk to read prayers on Sundays and a Schoolmaster to teach the children to read and write, and to facilitate the latters Teaching have composed in my Leisure hours a primer in Mohawk & English (the first they ever had) which may make those of some genius acquainted with the reading of English & be a help to become good Interpreters. They are very fond of the little Book both old & young & I have already from the Mohawks at Niagara recd Messages to send some there; I shall send Your Excellency a Specimen of it by the first opportunity; I had not long ago a Letter from Calvé the Interpreter to the Renards from Michillimakina, he has no Intelligence to give, but requests me to remind Your Excellency of what I heard Your Excellency tell him when last at Quebec, of recommending his son to the Professor of the French Accademy of this place and pay for his Schooling as he intended him to serve as an Interpreter.

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I have the honor to be with the greatest Respect Sir Your Excellency's Most obedient & most oblidged humble servant

DAN CLAUS

No. 26.

Canadian Archives, Series B, Vol. 185, Pt. 1, p. 106.

A Son Excellence frederic haldimand, Ecuyer Gouverneur, Capitaine General & Commandant en chef en cette province, etc. etc. etc.

Suplient humblement

Valentin Jautard et fleuri Mesplet & ont l'honneur de représenter à Votre Excellence qu'ils auraient été arrêtés par ses ordres Le 4 Juin 1779.

Que depuis un si long intervalle ils auraient seulement présenté à Votre Excellence Leur très humble petition en datte du 26 7bre 1780 dans laquelle apres avoir détaillé le triste etat ou leur fortune et leur santé etait reduite par une si longue detention Les supliants concluaient à ce qu'il plut à Votre Excellence accorder leur Elargissement (cette petition fut sans succès).

Qu'il s'est ecoulé près de deux ans sans que les supliants aient fait aucune démarche certaine de leur innocence, ils ont attendu patiemment un temps où ils pourraient se justifier.

Que si leur situation etait triste en 7bre 1780 combien deplorable ne doit elle pas etre aujourd'huy. Leur fortune, pour ainsi dire, anéantie, leur temperament ruiné. au point de perdre tout espoir de le rétablir ne leur

restant de consolation que la certitude de leur innocence, par consequent d'être sans remords.

Les supliants esperent qu'il plaira à Votre Excellence prendre ce que dessus en sa consideration et en consequence ordonner que leur procès soit instruit. Et dans le cas ou Votre Excellence ne jugerait pas apropos d'ordonner l'instruction de Leur procès qu'il luy plaise accorder aux dts suplians soussignés Leur elargissement.

Les suplians ne cesseront de faire des Voeux pour la prospérité de Votre Excellence.

V. JAUTARD
F. L. MESPLET

Prison du prevost Le 7 aout 1782

Endorsed—Memorial 1782 Mess. Jautard & Mesplette, Recd 7th Augt.

No. 27.

Canadian Archives, Series B, Vol. 185, Pt. 1, p. 119.

A Son Excellence Le Très Honorable Gouverneur Général De Quebec & Depandances, etc. etc.

Monseigneur.

Marie Mirabeau, épouse de Fleury Mesplet, se confiant en votre bonté & humanité envers les affligés prend la liberté d'importuner Votre Excellence pour lui représenter sa triste situation. Etrangere dans ce pays & après avoir consommé tout son peu de bien pour son propre besoin & celui de Son Marit, se trouve maintenant, sans ressource, & hors d'état de satisfaire aux emprunts qu'elle a été obligé de faire Pour se soutenir. C'est pourquoi mon General, elle se flatte que Son Excellence voudra bien donner l'elargissement à son marit qui vous en aura Monseigneur une eternelle obligation, & pour seureté de sa Conduite avenir elle se flatte de trouver & fournir deux cautions agreables au gouvernement, qui répondront de sa Conduite.

J'ai l'honneur d'être très Respectueusement, Monseigneur, Votre très humble obeissante Servante.

MIRABEAU MESPLET, femme Mesplet.

Endorsed—Memorial of the Wife of Mesplet, the Printer.

D. 28.

From the manuscript division of the Library of Congress. Extracts from Journals of Continental Congress, 23 Feb., 1776.

To Monsieur Mesplet, for printing the military rules, and French letters to Quebec | the inhabitants of Canada | the sum of £16 10 = 44 dollars.

No. 29.

26th February, 1776.

Resolved,

Monsieur Mesplet, printer, be engaged to go to Canada, and there set up his press and carry on the printing business, and the Congress engage to defray the expense of transporting him, his family and printing utensils to Canada, and will moreover pay him the sum of 200 dollars.

No. 30.

Note.—"In the Warrant book is a record of a payment of 200 dollars to the printer Mesplet for removing to Canada."

[The phrase between parallels does not occur in the original manuscript journal.]

27 May, 1785.

No. 31.

On a report from the board of treasury to whom was referred a memorial of Fleury Mesplet, printer.

Resolved that the sum of four hundred and twenty-six dollars and forty-five ninetieths of a dollar be paid to Mr. Fleury de Mesplet on account of expenses attending the transporting himself, family and printing utensils from Philadelphia to Montreal.

No. 32.

Papers of Continental Congress No. 41, Vol. 6, p. 305.

To the Honorable the President and Members of the Congress of the United States.

The Memorial of Fleury Mesplet of Montreal, in the Province of Quebec. Sheweth,

That your **Memorialist** was a citizen of Philadelphia; and in the year 1776, was happily established in his business of a printer in that city; That upon the conquest of a part of the Province of Quebec by the Arms of the **United States**, it was thought expedient to establish a **Press** in the town of Montreal; that your **Memorialist** on account of his **language** and known attachment to the interests of the **United States**, was selected by **Congress** to direct such a **Press**, and did at the request of **Congress**, and in hopes of the support and recompense of that body relinquish a comfortable situation and remove his **Press** at a very great expense, from Philadelphia to Montreal, where he unceasingly laboured to promote the interest of the **States**; until the evacuation of the province by their army, when on account of the impossibility of conveying his **Press**, he was constrained to remain in the exercise of his business, until he was apprehended and confined in the **Military Prisons** of Quebec as a **State Prisoner**, during the space of three years and six months, in which time he constantly wanted the conveniences frequently the necessities of life: That the cessation of arms has restored him to personal liberty, but deprived of the means of enjoyment, which can only be restored to him by the Justice and Bounty of **Congress**, in taking into consideration the circumstances of his case, and ordering such relief as it may seem to merit.¹

Montreal, 1st Août 1783.

FLEURY MESPLET.

Endorsed—Read 30 September, 1783.

Referred to Mr. Holton, Mr. Lee, Mr. Clarke. Discharged Nov. 1783.

No. 33.

Papers of Continental Congress, No. 41, Vol. 6, p. 303.

Événements pendant le voyage du Sieur Fleury Mesplet, imprimeur, parti de Philadelphie, sous les ordres exprès du respectable congrès pour aller, en qualité d'imprimeur, en Canada.

J'ai parti de Philadelphia, le 16 Mars 1776, mon épouse, Mr. Pochard, homme de lettre, deux ouvriers et un domestique.

¹ This is a printed document signed.

Le 8 d'avril j'ai arrivé au fort George, où j'ai attendu plusieurs jours, l'imprimerie qui était partie (par les ordres du Congrès) dans les voitures de Philadelphia; pour transporter la dite imprimerie du fort George à Montréal, j'ai été obligé de prendre cinq bateaux, qui ont été conduits à mes frais jusqu'à Montréal; il faut observer les grandes difficultés qu'il y a à faire le chemin, à cause des portages, changements de voiture avec un si grand train; mais c'était aux ordres du respectable Congrès.

Le 22 d'avril j'arrivai à Chambly, où il y a un Sault à passer: soit par la grande difficulté, ou la faute du pilote, les cinq bateaux remplirent si grande quantité d'eau qu'ils manquèrent périr, et en arrivant à Montréal, je trouvai une quantité de marchandise gâtées, comme de l'or en feuille, du papier doré, du papier indienné, papier blanc, et une quantité de livres, toutes les hardes de mon épouse, et une partie des miennes.

Une fois à Montréal il fallut former mon établissement, je louai une maison que j'occupe encore aujourd'hui, et je me flattais par les apparences à y faire mes affaires; mais malheureusement les troupes du Continent furent obligées de replier; aussitôt qu'elles furent hors de la province, je devins criminel aux yeux de tous ces animaux que l'on nomme royalistes, et ne tardèrent pas à je faire connaître, car huit jours après leur invasion, je fus conduit avec mes ouvriers et Mr. Pochard, en prison, où nous avons resté un mois, et Mrs. les Royalistes venaient de temps en temps nous présenter des cordes, en nous traitant comme si nous eussions été des sujets les plus nécessaires au Congrès, et par conséquent les plus à craindre à leurs yeux; **cela nous a fait honneur.**

Sorti de prison, Mr. Pochard prit le parti de s'embarquer pour l'Europe, Mr. Gray et Mr. Herse, mes deux ouvriers restèrent avec moi, mais je ne pouvais les occuper faute de papier; néanmoins je me flattais encore, qu'une fois que j'aurais reçu le papier de Londres, que j'avais demandé, je réparevois cette perte.

L'année ensuite je reçu mon papier, et avec l'aide de mes ouvriers et de mon intrigue, je me fis un fond honnête.

1778—Le 4 de juin j'établis un papier public, qui paraissait aux yeux des honnêtes gens, très-utile à la ville de Montréal, mais la canaille qui s'y trouvait trop souvent d'épéinte dans chaque état, tramèrent une ligue contre moi, et firent agir toute la puissance du Clergé auprès de Mr. Carleton, pour me faire chasser de la province; ils l'obtinrent et je reçus les ordres de Mr. Carleton, le 5 de juillet de la même année, qui m'ordonnait de quitter la province de ce jour au 25 septembre suivant, comme étant soupçonné dangereux au Gouvernement.

Mr. Haldimand, sur la fin de juillet, vint relever Mr. Carleton, et en conséquence d'une requête que je lui présenta il me laissa tranquillement jouir de mon état.

Cette même canaille¹ et même protecteurs² continuèrent de me persécuter, et sollicitèrent si fort auprès de Mr. Haldimand qu'ils parvinrent à me faire arrêter, le 4 de juin 1779, et je fus conduit dans les prisons militaires de Québec, où j'ai resté jusqu'au 1er septembre 1782, encore suis-je sorti fugitivement, sans quoi j'y serais peut-être encore.

FLEURY MESPLET.

Montréal, le 1er d'août 1783.

¹ "Royaliste"

² "Le Clergé"

No. 34.

Papers of the Continental Congress, p. 336-337.

A l'Honorable Président, et respectables membres du Congrès des Etats-Unis de l'Amérique.¹

Représentation du Sr. Fleury Mesplet, actuellement à Montréal, dans la province de Québec, en Canada.

Le représentant prend la liberté de rappeler dans la mémoire de vos Seigneuries, qu'ayant été établi à Philadelphie en l'année 1776, lors de la conquête d'une partie de la province de Québec, par les armes des Etats-Unis, on jugea convenable d'établir un imprimeur dans la ville de Montréal, et qu'en faveur de sa langue et de son attachement reconnu aux intérêts des Etats-Unis, il fut choisi par le respectable Congrès pour s'y transporter avec son imprimerie; et que l'ayant conduite à la réquisition du Congrès, tant dans l'espérance d'un encouragement que d'une récompense de la part de ce respectable corps; en considération de ces espérances, il a laissé un établissement assez favorable, et s'est transporté avec toute son imprimerie, à grans frais, de Philadelphie à Montréal, où il s'occupa uniquement à favoriser la cause des Etats-Unis, jusqu'à l'évacuation de la province par leur armée, auquel temps, vu l'impossibilité de transporter son imprimerie, il s'est trouvé obligé de rester dans la continuation de sa profession, jusqu'à ce qu'il fut arrêté et renfermé dans la prison militaire de Québec, comme prisonnier d'Etat durant l'espace de **trois années et demie**; pendant lequel temps il s'est vu privé, non seulement de toute commodité, mais même souvent des nécessités de la vie; la cessation d'armes lui a fait recouvrer la liberté de sa personne, mais lui a ôté les moyens d'en jouir, qui ne peuvent lui être rendus que par la Justice, l'Equité et la Générosité du respectable Congrès, en prenant en considération sa fatale et triste situation, et en lui accordant telle indemnisation et secours que leur générosité leur inspirera.

Quand je suis parti de Philadelphie pour Montréal, je possédais, en mon âme et conscience, tant en livres qu'en **papiers du Congrès**, la valeur de sept cent dollars. Pour accréditer le dit **papier** et encourager le Canadien à le prendre, j'ai vendu la plus grande partie de mes livres, et même donné de l'argent, **dollar pour dollar**, pour du **papier**, (dont je peux fournir certificat) me flattant toujours que le **papier du Congrès**, ferait aussi bon que celui des Banques de Venise et Londres. Aujourd'hui je ne possède, pour tout bien, que cinq mille dollars en **papiers du Congrès**, et je dois aux environs de deux mille dollars, que je ne peux payer avec ce même **papier**, de sorte que je me trouve dans l'impossibilité à pouvoir y faire honneur.

FLEURY MESPLET.

Montréal, 27 mars 1784.

Endorsed—Referred to the Committee of the State. Read in Committee, July 26th, 1784, and ordered to lie.

No. 35.

Papers of Continental Congress, p. 341.

Observations of Mr. Fleury Mesplet, printer to the Honorable Congress at Montreal.

In answer to the demands made to him by the Honorable Members of Congress Holten, Spraight, and Platt Esqrs., charged of the Committee to examine his petitions.

¹ Document signed.

By order from Congress and through the channel of the Honorable Mr. Chase at my domicile in Philadelphia where Speaking to me in person it was proposed to me to set off for Montreal, in Canada, in quality of printer for Congress, with all my utensils necessary for my press at the expense of Congress.

I accepted of the offer with as much the more pleasure as it was promised to me that I would receive every satisfaction and regard that my services would deserve. I only observed that I wanted instantly an indemnification for the quarter's rent of my house for which I had allowed to me one hundred dollars.

The expedition then took place immediately after the verification of my abilities by the respectable Congress in presence of the Honorable the President Hankok, Esq.; the Honorable Doctor Francklin and Mr. Tompson, secretary.

In this assurance I regulated all my affairs and got ready with all my effects to set out for Montreal. In consequence of which I had instantly sent to me five waggons to carry me until Lake George of which the expenses of waggonnage only was paid by Congress.

I then had with me of necessity a lettered man, two laborers, my wife and one servant for which I paid besides their current wages all the traveling expenses until Montreal.

From Lake George to Montreal I had all my effects carried by boats at my own expense. At my arrival at Montreal I was obliged to put up at a tavern with all my equipage until I got a house suitable to fulfill the intentions of the respectable Congress (the whole of this at my own expense).

It was in the month of May 1776, that I established my press at Montreal for the service of Congress, only in the course of the [month] of June the American troops being obliged to evacuate that place I was left at the mercy of the British Government.

I was taken up myself and all my workmen and with them confined in goal for the space of twenty-six days. My house, my papers and all my effects whatsoever were all seized—and it was only after many supplications and by means of some friends of my nation that I at length obtained my liberty and that of my people.

At the moment of my release my lettered man the most essential person in my business not being willing to support all the vicissitudes of the time demanded of me his dismissal and his payment. I could not then resist his claim and was obliged moreover to allow him an indemnification. All my hopes then were [were] that I flattered myself that those who had engaged me at their service would furnish me with means or give necessary orders for my relief from the tyranny which continually was exercised against me. I nevertheless always conserved the courage which an honest man is to have to fulfill his engagements especially such as those I have with the respectable Congress.

I always flattered myself that the American arms would be victorious in that province and that I would in fin enjoy the satisfaction which was promised to me by that respectable body.

Inboldened by the honor I had to be engaged by such an august body I dared everything I thought could be to their interest and consequently created to myself a number of enemies in every State until the unfortunate

epoch of the 3rd of June 1779, when I was again taken and confined in prison at Quebec on the supposition that I had printed and rendered public the Manifesto of the Count d'Estaing and notwithstanding my innocence my friends and my right, I suffered a detention of three and half years consecutively during which I suffered such miseries as humanity forbids to cite.

I supported my pain with firmness and flattering myself with the hopes of seeing at last that province united to the thirteen States, when at the return of the peace General Haldimand, my oppressor, gave me my liberty which was then in some degree insupportable to me by the ruin of my establishment, but what grieved me most was to see the province of Canada remain to the power of Great Britain. In that moment overloaded with debts, necessitated by the wants of my wife without help, and moreover obliged to render accounts to a partner (with whom I have settled and am indebted to him according to agreement sixteen hundred and sixty-seven dollars) I decided to write to the Honorable Mr. Enkok, the 4th August, 1783, and likewise to Mr. Tompson to request of these gentlemen to take my situation into consideration, I sent them a petition like the one I had the honour to present since my arrival here. I should have certainly preferred to come myself in person before the respectable Congress had my faculties permitted me to do it.

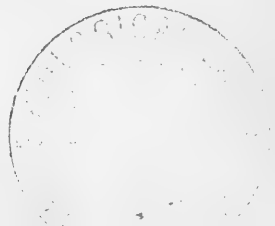
I waited with great impatience for an answer but in vain; the 4th of April, 1784, I take the liberty to write a second letter to the Honorable Mr. Henkok who undoubtedly could not give me any answer.

In fin I wrote another letter to the Honorable Mr. Meffenne then President of Congress, the 31st of March, 1784, and am still deprived of any answer from either of the gentlemen.

In the month of November last I charged a friend to see the Honorable President of Congress to recall to his Memory the request I made to him (being still deprived myself of means of transporting me there in person) he was kind enough to tell him that he knew perfectly well all my affair that he had received my petition and that he would with pleasure interest himself to see me righted. But that it was absolutely requisite that I should come in person; my friend observed him the impossibility of me making such expenses being entirely destituted of means—he desired my friend to engage me to make a last effort and come and told him that he had not the least doubt of the satisfaction I was to expect from the equity of the respectable Congress. In consequence that same friend has been good enough to furnish me with a sufficiency to enable me to make this voyage, and I am now gentlemen expecting of your honours the Justice due to a zealous servant of Your Respectable Body.

Your Honours have demanded of me an account of my expenses and a near computation of the damages I sustained.

In obedience to your command Gentlemen I have hereunto annexed an exact account of my expense only and with regard to the hopes I shall never permit myself to tax your Honours, I have never doubted of our justice and shall confide to it. The triumph of America over the tyranny of Great Britain is all my satisfaction I desire. I shall esteem myself too happy if my services can still be agreeable to Your Honours and shall be eternally devoted to your commands.



With these sentiments I shall remain for ever with the highest reverence and profound respect, Gentlemen of Your Honours, the most obedient and very humble servant,

FLEURY MESPLET.

No. 36.

Papers of the Continental Congress, p. 351.

I, the underwritten, do hereby certify that sometime in the month of May 1776, Mr. Fleury Mesplet came to Montreal, in order to set up a Printing Office. That some time in the month of June then next following (the time when the American troops evacuated that place), persons were employed by the British Government in order to watch very closely the said Fleury Mesplet, which they did for the space of eight days, afterwards he was taken with all his workmen and confined for twenty-six days. That at the expiration of that period, the said Fleury on the earnest solicitation of his friends, was released, but still very closely watched and deprived of all the means to make his escape out of the province. That on the third of June 1779, he, the said Fleury was again apprehended on suspicion, and sent to the jail of Quebec, where he was kept confined for the space of three years and a half, consecutive, and was not released until the happy event of the peace took place.

March, 31st, 1785.

JH. PERINAULT.

Philadelphia, ss

Personally appeared Joseph Perinault, at present of the City of Philadelphia Gent. and made oath according to law that the foregoing certificate contains the whole truth respecting the matter therein contained and expressed, sworn at Philadelphia, the 1st March, 1785.

Coram.

JOHN MILLER.

No. 37.

Papers of the Continental Congress, p. 351.

During my stay last winter and spring in Canada I frequently heard Mr. Mesplet's name mentioned as one of the sufferers in the American cause during the late war, and that he had been confined at Quebec upwards of three years and not liberated until peace. I also understood from several well disposed to the American Revolution (as well at Quebec as Montreal) that Mr. Mesplet was considered as an American and had given proofs of his attachment to the Independance of the United States.

Phil., March 31st, 1785.

ISAAC MELCHOR.

No. 38.

Papers of the Continental Congress, p. 352.

We, the subscribers, certify to all whom it may concern, that Mr. Fleury Mesplet, printer in the city of Philadelphia, has set off from the said city for Montreal in Canada, in the month of March, 1776, in the capacity

of a printer for the United States, and that he has taken with him his family, furnitures, press and every other things belonging to his printing office; and we do further certify that he has engaged to go with him, the following persons, viz.:

Mr. Alexander Pochard, a gentleman of learning,

Messrs. John Grey and Hers, both as journeymen, printers, and one servant.

Philadelphia, March 31st, 1785.

P. G. BRETON.
JAMES VALLIANT.

Philadelphia.

Personally appeared P. G. Breton and James Valliant, both of the city of Philadelphia, and made oath according to law that the above certificate contains the whole truth respecting the matter therein mentioned and expressed.

Sworn at Philadelphia, the 31st March, 1785.

Coram

JOHN MILLER, I. P.

No. 39.

Papers of the Continental Congress, p. 367.

I, the Underwritten, do certify that Mr. Fleury Mesplet, a printer from Philadelphia, was sent in the same capacity by Congress to Canada, with orders to settle at Montreal. That he had along with him a compositor, two pressmen and a servant. That His Excellency John Hancock, late President of Congress did in my presence (as I was attending as interpreter to the said Mesplet) promise him in the name of Congress, to defray every reasonable expense to which he might be subjected in his then present situation, and that Congress would besides give him an adequate compensation for his pains, and the disadvantages attending his removal.

JOHN GERMON.

Philadelphia, March 31st, 1785.

Philadelphia, ss

Personally appeared John Germon and made oath according to law, that the above certificate contains the whole truth respecting the matter therein mentioned and expressed.

Sworn, the 31st March, 1785.

Coram

JOHN MILLER, I. P.

No. 40.

Papers of the Continental Congress, p. 371.

I, the Underwritten do certify that all persons to whom I have spoken about Mr. Fleury Mesplet, have assured me that ever since he arrived into Canada, he was continually labouring under various vexations, and that

among others, Messieurs Loubet, Marrassé, Meyrant, Deshautelle, and Legay, merchants at Montreal, have all assured me that Mr. Mesplet was continually surrounded by spies and enemies from whom it was altogether impossible for him to escape, that besides, it is well known to the whole town, that Mr. Mesplet has sold goods in the way of his trade, for Continental Currency, and that he even gave gold and silver in exchange for paper money.

Philadelphia, March 31st, 1785.

ETIENNE FOURNIER.

Philadelphia, ss

Personally appeared Etienne Fournier and made oath according to law, that the above certificate contains the whole truth concerning the matter therein mentioned and expressed.

Sworn, the 31st March, 1785.

Coram

JOHN MILLER, I. P.

No. 41.

Papers of Continental Congress, p. 357.

Philadelphia, April 1st, 1785.

Dear Sir:—

The bearer, Mr. Fleury Mesplet, is one of those unfortunate strangers who depending upon the hasty promises of zealous whigs in 1776, went to Canada as a printer (or agent) for the United States, was in consequence of his exertions imprisoned three years and a half and finally ruined.

He has presented a memorial to Congress with an estimate of his losses and wishes to have your friendly aid in support of his claim. The ostensible situation I was in last year has exposed me to the attacks of strangers who have claims on the Justice or generosity of Congress and it is but seldom that I am so fortunate as to avoid a disagreeable interference. The present case is one of those I cannot parry. You will therefore forgive me for introducing Mr. Mesplet to you with my request that you will assist him in his application to Congress so far as it may appear just and reasonable.

I am with much friendship, Dr. Sir,

Yours,

THO. MIFFLIN.

The Honorable Mr. Hardy, of Virginia, in Congress, New York.

Favored by Mr. Mesplet.

Papers of the Continental Congress, p. 364.

Memorandum of expenses made by Fleury Mesplet, printer to Congress at Montreal, viz.:

From Philadelphia to Albany and from there to Lake George, 6 persons, 32 days at 8/	£ 76.16
From Lake George to Montreal, five boats furnished by Congress conducted by 6 men, each for supplement to their nourishment and drink at the rate of 4/— 22 days, 30 men	132.00
For myself and my people, 22 days, 6 persons at 8/ prd'y....	52.16
The boats (aux Saults de Chambly) leaked and occasioned me a damage estimated by a clerk sent by Mr. Francklin....	200.00
For unloading cartage and portorage for one day at Montreal....	8.00
For board of 6 persons at the Tavern, 11 days at 8/....	26. 8
For expenses for the press as pr. acct. of laborers....	72.00
From the 6 May 1776 to the 10 June, day of my confinement with my people, 34 jours, 6 persons 8/....	81.12
26 days confinement, 6 persons at 8/....	62. 8
At my enlargement my lettered man protegled by Mr. Francklin left me—his wages and passage to Europe....	60.00
Carried over....	772.00

At that epoch I had two workmen with which I had agreement for one year which I was obliged to board and pay without employing having no paper they cost me by near computation..	200.00
From 6 May 1777, I remained alone with my wife and one servant until the 3rd June 1779, without work having no other resource than to sell books at loss—which I nearly estimate as least....	600.00

At the 3rd June 1779, I was taken and transfered to goal to Quebec where I stayed 3½ years during which I was obliged to contract debts for my subsistence with my family—which can be attested by all the honest citizens of that province of which I can give proves, viz.:

To Mr. des Hautelles..	£ 600.00
Mr. Aubord Courier..	200.00
Mr. Fortler..	263.12
Mr. Gray..	96.00
Mr. Poirier..	40.00
Mr. Lemoine..	40.00
Mr. Egmond..	22. 8
Mr. Egdouard..	26.16
Mrs. McClemand..	10.00
Mr. Delisle..	16.00
By engagement to my partner Mr. Berger..	666.16
	£ 1971.12
	£ 3543.12

ROYAL SOCIETY OF CANADA

No. 43.

Papers of the Continental Congress, p. 409.

To the Right Honourable the United States in Congress assembled.

The humble petition of Fleury Mesplet, late printer of Congress at Montreal.

Gentlemen:—

Your petitioner takes the most respectful liberty to represent to you that he has been for this three months past imploring the clemency of Your Honours. Flattering himself that in consequence of the proofs he has given of the justness of his pretensions by the several certificats which he has furnished to the gentlemen appointed by Your Honours to examine his affair, that you would be pleased gentlemen to take it immediately into consideration and render him the justice due to his services—he has remained hitherto in a most profound silence not daring to importune Your Honours, but his detention here reducing him to the greatest extremity, he is forced to make this address to Your Honours.

Beseeching you, gentlemen, to cast a favorable eye upon a man who through his zeal and attachment for your interest has sacrificed all his worth and totally ruined himself and family. And if his distressful situation can any ways touch your hearts and inspire Your Honours with any pity for him, he intreat Your Honours to enable him to fulfill the engagements which he was obliged to contract during his imprisonment at Quebec, and free him from the embarrassment in which he is involved in order that he might return to Montreal, where his unfortunate wife overwhelmed with grief only supports herself in the hopes of seeing him return entirely satisfied from Your Honours.

In the deplorable situation in which he is plunged he has no other hopes of relief then the compassion and generosity of Your Honours. To Montreal he dare not return to avoid the pursuits of his creditors and should unfortunately, Your Honours Shew him the least indifference in granting his request he would be reduced to despair; as he would have no resource—whatsoever—left him but flight—and his miserable wife also reduced to the greatest necessity and the mercy of the public as the few effects which his enemies have left him would immediately be attacked and sold by his enraged creditors.

If your petitioner had had the least recourse to make to himself in his conduct towards Your Honours he would not have persisted so long in his demands but he dares to repeat to you, gentlemen, that he has sacrificed himself, his wife and fortune to adhere to your cause, being fully persuaded that nothing could equal the Justice of Your Honours.

Therefore he beseeches you, gentlemen, to consider his distressful position and not abandon him to despair the resolution which Your Honours have been pleased to pass to allow him 426 dollars is hardly sufficient to balance the expenses which he has been obliged to make for himself and a friend who accompanies him to assist him in his affair and who has advanced to him his journey expenses from Montreal in the middle of winter—from here Philadelphia and return and since for both their subsistence in this city. Therefore your petitioner is in the impossibility to leave this place with this small sum as he dare not appear at Montreal unless he could present to his creditors a definitif resolution from Your

Honours as he would run the hazard to be again confined to goal until he could discharge their demands.

May it therefore please Your Honours to grant him your benevolence and deign to render him his life and happiness by rendering him your Justice—and he dares to hope that of what nature the resolution of Your Honours will be that he will never have to repent to have been your attached servant, etc., able for ever to retain the same sentiments of esteem and veneration with which he has always been penetrated for Your Honours.—And your petitioner will not cease to address his most fervent prayers to heavens for the long life and preservation of Honours and for the future happiness and prosperity of this and the other States of America.

FLEURY MESPLET.

Endorsed—Read June 2nd, 1785.

Committee of week, June 13, to be filed.

E.

From the register of Notre Dame, Parish church, Montreal.

No. 44.

B. de Marie Josepte Tison.

Le cinq février, mil sept cent soixante-six a été baptisée par moi sousigné Marie Josepte, née de cette nuit, environ minuit, fille légitime de Jean Baptiste Tison et de Marie Anne Picard, a été parrain Dominique Perrin, marraine Marie Josepte Arrivée qui ont signé,

MARIE JOSEPTE ARRIVEE,

TISON.

D. PERRIN.

ROBERT, prêtre.

No. 45.

S. de Marie Mirabeau, épouse Fleury Mesplet.

Le deux septembre mil sept cent quatre-vingt-neuf, par moi prêtre soussigné, a été inhumé, dans le cimetière proche l'église, le corps de Marie Mirabeau, décédée d'hier, âgée d'environ quarante-trois ans, épouse de Fleury Mesplet, imprimeur dans cette ville; ont été présents Messirs. Marchand et Poulin de Courval, prêtres soussignés; Poulin de Courval, prêtre

JOS. BORNEUF, prêtre.

No. 46.

M. de Fleury Mesplet et de Marie-Anne Tison.

Le treize avril mil sept cent quatre-vingt-dix, après la publication d'un ban de mariage sans empêchement ni opposition, vu la dispense des deux autres bans accordé par messire Jean Brassier, grand vicaire de Monseigneur l'Evêque de Québec, prêtre du Séminaire de Montréal, soussigné faisant les fonctions curiales en cette paroisse ayant pris le mutuel consentement par paroles de présent Mr. Fleury Mesplet, demeurant dans cette paroisse, âgé de cinquante-cinq ans, veuf de dame Marie Mirabeau, fils de feu Mr. Jean Baptiste Mesplet et de défunte dame Marie Antoinette Capeau, ses père et mère, de la paroisse de St-Nizier, diocèse de Lion, en France; d'une part et d'aussi présente Marie-Anne Tison, âgée de vingt-trois ans, fille de Jean Baptiste Tison et défunte Marie-Anne Picard, ses père et mère, de cette paroisse d'autre part; les ai marié selon les règles et cou-

tumes observées en la Ste. église en présence de Joseph Desautels et du Sr François Leguay, amis de l'époux; de Jean Baptiste Tison, père de Jean Baptiste Tison frère; de Marie Deslauriers et de Marie Cathrine Baron, belles-soeurs de l'épouse, et de quelques parents et amis dont les uns ont signé ainsi que les autres ont déclaré ne savoir signé,

FLEURY MESPLET, MARIE ANNE TISON,
LEGUAY, JOSEPH DESAUTELS, TISON,
JEAN BAPTISTE TISON, fils.

FR. DEZERY, prêtre.

No. 47.

B. de Fleury Tison.

Le vingt-neuf octobre mil sept-cent quatre-vingt-onze, par moi, prêtre soussigné, a été baptisé né d'hier de légitime mariage de Jean Baptiste Tison et de Magdelaine Leguay, son épouse; le parrain a été Fleury Mesplet et la marraine Marie Anne Tison qui ont signé avec nous,

TISON, FLEURY MESPLET,
MARIE ANNE TISON MESPLET.

ALEXIS DUROCHER, prêtre.

No. 48.

Le 30 octobre 1791, Mesplet a été parrain a Marie Thérèse Stringer.

No. 49.

S. de Fleuri Mesplet.

Le vingt-six janvier mil sept cent quatre-vingt-quatorze, par nous prêtre soussigné, a été inhumé dans le cimetière proche l'église le corps de Fleury Mesplet, décédé d'avant-hier, âgé de soixante ans, ont été présents sieur Duranceau et Baron, c'auteurs soussignés, •

ANDRE BIRON,

J. C. DURANCEAU:

RAIZENNE, prêtre.

No. 50.

S. de Marie Anne Tison.

Le sept septembre mil huit cent-quarante, je, prêtre soussigné, ai inhumé Marie Anne Tison, décédée le quatre du courant, âgée de soixante-quatorze ans, veuve de Fleury Mesplet, imprimeur de cette paroisse. Témoins, Marcel Boucheret, Antoine Léveillé qui n'ont su signer.

P. O'CONNELL, prêtre.

F.

From the Archives of the Court House, Montreal.

No. 51.

Pre. Mezières, notary.

Compromis entre le Sieur Fleury Mesplet et le sieur Charles Berger.

Par devant les No'res Roiaux de la province de Québec, résidents à Montréal soussignés.

Furent présents le Sieur Fleury Mesplet, imprimeur et libraire, demeurant en cette ville, d'une part; et le sieur Charles Berger, marchand établi en France de présent en cette dite ville d'autre part.

Lesquelles parties désirant compter, régler et terminer entre elles à l'amiable leurs droits et prétentions respectifs pour fait de la société en commandite passée entre elles le premier mars mil sept-cent-soixante-seize, dans la ville de Philadelphie, en la province de Pensilvanie sous leurs seings

et en présence de témoins, et pour le fait et causes y exprimées, aussi bien que pour toutes autres prétentions, soit d'un côté ou de l'autre, qui seront établies ou fondées par billets, reconnaissances, comptes, correspondances, ou autrement et généralement toutes affaires entre elles du passé jusqu'à ce jour de quelques natures qu'elles puissent avoir été et être, sans aucunes réserves ni restrictions quelconques et ce pour vivre en paix et prévenir tous procès, ont nommé pour leurs arbitrateurs et amiables compositeurs, se voir: le dit sieur Mesplet, Mrs. Jean Dumas St-Martin, écuyer; le sieur Joseph Borel, négociant et le sieur Berger, Mrs. Joseph Périnault et Joseph Perrault aussi négociants auxquels les dits sieurs Mesplet et Berger donnent respectivement pouvoir et autorité de juger, régler et terminer tous leurs différends et contestation sur et au regard des objets ci-devant mentionnés, et ce sur les pièces, preuves et productions qui leur seront remises et fournies incessamment, afin que les dits sieurs arbitrateurs puissent rendre leur jugement arbitral, dans quinze jours au plus tard; et dans le cas où les dits sieurs arbitrateurs ne se trouveraient de même sentiment ils pourront nommer tel sur-arbitrateur qu'ils aviseront pour cinquième, afin de rendre conjointement leur jugement arbitral, auquel les parties promettent respectivement acquiescer, à peine de payer par le contrevenant à l'acquiesçant,—la somme de cinq-cents livres, monnaie du cours actuel de cette province, avant d'être reçu à rien proposer contre le dit jugement arbitral, et laquelle peine ne pourra être réputée comminatoire. Et pour l'exécution des présentes et prononciation de la sentence arbitrale qui interviendra les parties ont élu leurs domiciles, savoir: le dit sieur Mesplet en sa maison près du marché en cette ville, et le dit sieur Berger en celle du sieur Mesplet, rue Notre-Dame, auxquels lieux, etc., nonobstant, etc., prompt., etc., obligt., etc., rent., etc.

Fait et passé à Montréal en l'étude l'an mil sept-cent-quatre-vingt-quatre, le troisième novembre avant-midi, et ont les parties signé avec nous lecture faite.

(Signé) CH. MESPLET,
C. BERGER,
FOUCHER, Not. Royal,
PRE. MEZIERE, Not. Royal.

No. 52.

Extension of time for rendering award.

Je consens qu'il soit donné telle extension qu'on jugera à propos au compromis qui a été passé entre le sieur Charles Berger et moi pour ce qui concerne le temps qui sera nécessaire aux arbitres, pour terminer nos affaires respectives entre le dit sieur Charles Berger et moi, à Montréal, le 16 Novembre 1784.

F. MESPLET.

No. 53.

Award of Arbitrators.

Nous soussignés arbitres nommés par Messieurs Fleury Mesplet et Charles Berger, pour terminer définitivement leurs comptes respectifs concernant leur société et autres comptes particuliers ainsi qu'ils s'y sont soumis par un compromis passé entre eux le trois du courant sous la pénalité de cinq cents livres cours actuel, lequel n'étant que pour quinze

jours, a été continué du consentement des parties jusqu'à ce jour; et comme il était nécessaire avant d'en venir à assurer leur susdit comptes de réfléchir mûrement sur leur acte de société, d'en peser et déterminer les conventions, et éclaircissement nous ayant laissé quelques doutes nous avons jugé à propos de faire choix de la personne du sieur Benjamin Frobisher, Ecuyer, pour éclaircir nos doutes et balancer nos opinions; et d'après ces justes précautions nous avons alloué au sieur Charles Berger le capital qu'il a mis dans la société de mille Pounds courant de Philadelphie, faisant ancien cours de cette province, porté en l'autre part mille Pounds de Philadelphie £ 16,000.00

Plus pour profit que Mesplet lui a fait bon a tout événement de cent pounds de Philadelphie pendant trois ans. 4,800.00

Plus pour trente-deux portugaises que Mesplet reconnaît devoir par sa lettre du 24 Mars 1776. 1,536.00

Pour effet que le dit Mesplet a vendu appartenant au dit Berger conformément au compte du dit Mesplet. 803. 5

£ 24,068. 9

Et pour objets que le dit Berger doit prouver avoir acheté pour le compte de la société et justifier qu'ils ont été pris par les ennemis. Savoir:

Payé par Mr. Berger à Mr. Germentown de Philadelphie pour caractères. £ 400.00

Payé par le même au graveur. 36.00

Item pour avoir fait parer des peaux. 18.00

Item 180 rames de papier achetées à Philadelphie à 24/. 4320.00

4,774.00

£ 28,842. 9

Ce qui forme la somme totale de vingt-huit mille huit cent-quarante-deux livres neuf sols anciens shellings de cette province que le dit Mesplet se trouve redevable au dit Berger sauf la restriction ci-dessus de quatre mille sept cent-soixante et quatorze livres à Montréal, le 27 novembre 1784.

(Signé) DUMAS,
P. MARTIN,
JH. PERINAULT,
J. F. PERRAULT,
JH. BORREL.

No. 54.

Obligation or Bond from F. Mesplet to Charles Berger, 29th Dec., 1784.

Par devant les notaires royaux de la province de Québec, résidents à Montréal, soussignés,

Fut présent le sieur Fleury Mesplet, imprimeur et libraire, demeurant en cette ville,

Lequel a reconnu confessé devoir loyalement et légitimement au sieur Charles Berger, marchand, actuellement en cette ville, à ce présent et acceptant la somme de sept mille deux cents chelins, ancienne monnaie de cette

province, laquelle avec celle de deux mille huit cents chelins susdits que le dit sieur Mesplet s'est obligé par son billet de ce jour conjointement avec le sieur Marassé de payer au sieur Berger en juin prochain feront celle de dix mille chelins susdits, à laquelle somme le dit S. Berger a modéré celle de vingt-huit mille huit cent-quarante-deux livres neufs sois, à laquelle le dit Mesplet a été reconnu redevable envers lui suivant le procès verbal rendu, en vertu de compromis passé entre eux, le trois novembre dernier, par Messrs. Dumas St. Martin, Ecuyer; Joseph François Perrault, Joseph Perinault, et Joseph Borel, négociants; en date du vingt-sept du mois de novembre dernier demeuré annexé à ces présentes; le dit S. Berger ayant déclaré que la remise qu'il faisait au dit Mesplet était en considération des pertes et des malheurs, qu'il avait éprouvés dans ses affaires à quoi il est très sensible en sorte qu'il dit et déclare qu'il s'est contenté de la dite somme de dix mille chelins anciens susdits, laquelle une fois payée par le dit Mesplet, il sera entièrement quitte et déchargé envers le dit S. Berger, de toutes dettes et affaires quelconques avec lui du passé jusqu'à ce jour, soit pour raison de leur société ou autrement. Et laquelle somme de sept mille deux cents chelins restante à payer, le dit sieur Mesplet promet et s'oblige en effectuer le paiement au dit sieur Berger à son ordre ou au porteur dans l'espace de deux années à compter de ce jour, et en quatre paiements égaux qu'il fera de six mois en six mois, avec l'intérêt à raison de six pour cent par an, aussi à compter de cette date jusqu'au réel et parfait paiement de la dite somme, et pour opérer la sûreté du paiement, le dit sieur Mesplet a soumis obligé, affecté et hypothéqué tous ses biens présents et à venir et spécialement son imprimerie, tout ce qui la composent et y est accessoire sans qu'une obligation déroge à l'autre; et pour l'exécution des présentes le dit sieur Mesplet a élu son domicile en sa maison où il est actuellement résident appartenant à Monsieur de Longueuil, scise en cette ville rue Capital, auxquels lieux, etc., obligt., etc., renonçant, etc.,

Fait et passé à Montréal, en la maison du dit sieur Mesplet, l'an mil sept cents quatre-vingt-quatre le vingt-neuvième jour du mois de décembre, après-midi, et ont les parties signé avec nous lecture faite. Il est convenu que les termes ci-dessus auxquels le dit sieur Mesplet a accédé pour effectuer le paiement de la somme de sept mille deux cents chelins anciens, n'a été que dans la confiance qu'il serait payé des prétentions qu'il a par le Congrès Américain, mais comme il pourrait arriver que ces remboursements ne seraient point effectués avant les dits termes, mon dit sieur Berger confesse que le dit sieur Mesplet ait pour payer la dite somme les dits termes suivants, savoir un tiers de la dite somme dans dix-huit mois de cette date et les deux autres tiers de la dite somme de six mois en six mois, après l'échéance du dit premier terme par proportion, avec les intérêts comme ils sont stipulés.

(Signé) FLEURY MESPLET,
C. BERGER,
A. FOUCHER, Not. Royal,
PRE. MEZIERE, Not. Royal.

No. 55.

Power of Attorney from Charles Berger.

Procuration par le sieur Charles Berger aux sieurs Louis l'Hardi et Clément Herse.

Par devant les notaires royaux de la province de Québec, résidant à Montréal soussignés, fut présent le sieur Charles Berger, marchand actuellement en cette ville,

Lequel étant sur son départ pour l'Europe a fait et constitué pour ses procureurs généraux et spéciaux Mrs. Louis l'Hardy et Jacques Clément Herse, marchands de cette ville, auxquels il donne conjointement ou séparément pouvoir de pour lui et en son nom, toucher et recevoir du sieur Fleury Mesplet, imprimeur et libraire, demeurant en cette ville de ses droits et ayant cause, la somme de sept mille deux cents chelins ancienne monnaie de cette province à lui due par le dit sieur Mesplet et payable en différents termes suivant l'obligation passée devant Mr. Mézière et son confrère Nore, le vingt-neuvième décembre, mil sept cent quatre-vingt-quatre, de l'expédition de laquelle les dits sieurs, procureurs constitués, seront porteurs, en cas de payment ou satisfaction des dits termes donner toutes quittances et décharges valables, et a défaut de payment ou satisfaction former et intenter toutes demandes et actions en justice, tant contre le dit sieur Mesplet principal obligé que contre tous autres qu'il appartiendra par toutes voies que de droit, et sur le tout plaider, appuyer, élire, domicile, constituer procureur ou avocat en cause, frayer les déboursés, compromettre, transiger et généralement faire tout ce qui sera nécessaire jusqu'à jugement ou arrêt définitif et iceux mette à exécution.

Promet., etc., obligeant, etc., faire, etc.

Passé à Montréal, en l'étude l'an mil sept cent quatre-vingt-cinq, le seizième février avant-midi, au dit Sr. Constituant, signé avec nous, lecture faite.

B. BERGER,
J. DESLISLE, N. P.
PRE. MEZIERE, Nore R.

No. 56.

Mesplet's receipt for money borrowed from Desautels.

Je reconnois avoir reçu de Mr Desautelle, tailleur à Montréal, la somme de huit mille livres chellins de la province qu'il m'a prêté en argent, promois lui payer l'intérêt, pour chaque six mois, à cinq pour cent, jusqu'au remboursement du capital, ou à la demande fait à Montréal le 29 Juillet 1778.

FRANCOIS LEGUAY, père, notary.

FLEURY MESPLET.

Obligation or bond from Mesplet to J. M. Desautels for 8000 livres \$1333.

30 Aug., 1784.

Par devant les notaires de la province de Québec, résident à Montréal, soussigné pour présent Mr. Fleury Mesplet, imprimeur et libraire, demeurant en cette ville, rue Capital, lequel reconnaît et confesse devoir bien légitimement à M. Joseph Marie Desautel, tailleur d'habit, demeurant en cette dite ville, rue St. Paul, la somme de huit mille livres ou chelins anciens cours de cette province, pour prêt et avance d'argent que le dit sieur Desautels lui a fait ci-devant pour employer en ses affaires ainsi qu'il

appert au billet du dit débiteur en date du vingt-neuf juillet mil sept cent soixante dix-huit, signé et écrit de sa main s'obligeant icelui débiteur à payer l'intérêt à cinq pour cent sur icelle, somme reconnaissant le dit billet ce jourd'hui juste et droit, dont icelui débiteur à payer l'intérêt suivant icelui, demeure à ces présents, cependant payable la dite somme de huit mille livres chelins, à première demande du dit sieur créancier qui voulant et désirant assurer sa créance nous a requis acte à lui octroyé à peine et ce pour quoi le dit débiteur élit son domicile en sa demeure susdite, auquel lieu, &c., et notwithstanding, &c., et promettant, &c., et obligeant, &c., et renonçant, &c., fait, &c., et passé à Montréal. Maison mon dit sieur créancier l'an mil sept cent quatre-vingt-quatre, le trente août avant-midi, et à mon dit sieur débiteur signé en présence avec le sieur créancier et nous notaires avec paraphe lecture faite suivant l'ordonnance.

JOSEPH DESAUTELS,
J. H. PAPINEAU,

FLEURY MESPLET,
FR. LE GUAY.

No. 57.

Ce jourd'hui vingt-deux février l'an mil sept cent quatre-vingt-quatorze est comparu au gref les sus nommé Joseph Marie Desautels qui en présence des témoins sous signés a déclaré avoir reçu l'entier payment de l'obligation ci-dessus dont quittance les jours et au sus dits témoins.

Témoins, TISON père,
JS. REID.

JOSEPH DESAUTELS,

No. 58.

Draft of a deed of compromise by Mesplet

L'an mil sept cent quatre-vingt-cinq, le neuf juillet, sont comparus devant le soussigné notaire de la province de Québec, résidant à Montréal, les soussignés créanciers de sieur Fleury Mesplet, imprimeur et libraire, demeurant à Montréal sur la place du marché, lesquels créanciers sur les représentations d'impossibilité où se trouve le dit Mesplet de s'acquitter de ses obligations envers eux, montant à environ à un capital (de mille livres cours d'Halifax) qu'il doit, voulant et désirant les dits sieurs créanciers favoriser, le dit sieur Mesplet leur débiteur et lui procurer le moyen de gagner sa vie dans son état lors du crédit et par là s'assurer de leurs créances chacun d'eux des dits sieurs créanciers sousignés ont consenti et consentent à lui accorder quatre années de délai de payment à compter du mois d'octobre prochain, en octobre que l'on comptera mil sept cent quatre-vingt-six, lequel payment sera de cent vingt cinq livres courant. Deux cent cinquante livres en octobre mil sept cent quatre-vingt-sept. Pareille somme en octobre mil sept cent quatre vingt-huit et enfin trois cent soixante-quinze livres courant Halifax au même terme d'octobre, que l'on compte mil sept cent quatre-vingt-neuf pour tous délais et sans intérêts et que Mesplet hypothéquera son imprimerie aux dits créanciers sans qu'aucuns des dits sieurs créanciers soussignés puissent inquiéter ni troubler le dit débiteur ni se prévaloir de sa créance et quand des dits payments faits et aux termes sus-dits être partagés au prorata des sommes qui auront été avancées au dit débiteur.

Les comptes sont ci-après au bas des présentes.

M. Desautels n'a qu'à faire une opposition entre les mains de Fleury Mesplets pour les 7200 livres qu'il doit par accord à son associé Berger en vertu d'une sentence obtenue contre Berger et Mesplet.

No. 60.

Fleury Mesplet doit à divers, savoir:

Messieurs Fortier.. . . .	2616.00
Desotelle.. . . .	8738.00
Dellard.. . . .	900.00
Lusignan.. . . .	540.00
Delisle frs.. . . .	164.16
Hardy pour lui et Mr. Berger.. . .	7400.00*
Edmon à Québec.. . . .	336.00
Lemoine à Québec.. . . .	552.00
Mme. M'Clemañ.. . . .	151.18
Gray, marchand négociant.. . . .	1201.10
Edward, libr. et directeur de la presse..	300.00
Fizette, menuisier.. . . .	150.00
Du Calvet.. . . .	616.00*
King et McCord (aux environs de)..	168.00
Porliar Lamarre.. . . .	600.00

* Sauf erreurs et omissions.

These items are erased in the manuscript but they represent amounts due by Mesplet which were not pressing.

No. 61.

Bailiff's sale of Mesplet's stock and furniture.

L'an mil sept cent quatre-vingt-cinq, le vingt^e et un novembre, à dix heures du matin, après avertissement au son de cloche pour la ville et faubourg de Montréal, nous, notaire de la province de Québec, à la requête du sieur Joseph Marie Desautels, bourgeois de cette ville, rue St. Paul, nous sommes transporté en la maison du sieur Fleury Mesplet, imprimeur, pour et en vertu d'une exécution émanée de la Cour des Plaidoyers Communs, en date du 22 juillet dernier, à nous exhiber et y jouisse les effet saisis par l'huissier Garnot, aussi en date du 25 juillet suivant, nous en notre dite qualité après un nombre des personnes assemblées en la maison du dit sieur Mesplet avoir procédé à la vente des effets saisis pour iceux être vendues en public au plus offrant et dernier enchérisseur ainsi que de droit et à signé le dit requérant ces présentes avec nous le jour et l'an suscrit,

L. GARNOT,
JOSEPH MARY DESAUTELS,
FR. LE GUAY.

Amounts of purchees by différents individuals at sale:

Desautels.. . . .	2661.15
Huet.. . . .	599.10
Jautard.. . . .	191.10
Dubord.. . . .	115.00
Berichon.. . . .	18.00
Le Guay.. . . .	54.12
Fleury.. . . .	16.15
Dupré.. . . .	11.14

Une imprimerie complète avec deux presses garnies qui après avoir été criées à divers reprises s'est trouvé monter à la somme de	
Desautels, cinquante livres cantiques de Marseille, adjugés à trois livres pièce..	150.00
Desautels, cent cinquante Journée du Chrétien, reliés.. . . .	130.00
Desautels, cent vingt-quatre psautiers, reliés en feuilles.. . .	63.00
Huet, trois cent brochures intitulées, Ami des Enfants.. . . .	50.00
Dubord, cinq cent alphabets français..	115.00
Desautels, cent brochures de dévotion aux saints anges.. . . .	19.00
Huet, deux rames papier marbré..	23.00
Desautels, cent brochures de dévotion au saints anges.. . . .	19.00
Huet, cent catéchismes pour enfants..	33.00
Huet, deux cent brochures pour règles de change, monnaie.. . .	10.00
Desautels, cinquante semaines saintes, reliés..	97.00
Huet, quarante brochures neuvaines de St-Antoine..	14.00
Huet, cent brochures, Ecu de Six Francs..	12.00
Huet, six grands écritoirs d'étain..	30.00
Jautard, deux grands écritoirs ronds..	8.00
Huet, vingt-quatre écritoirs de plomb et étain..	25.00
Huet, dix-huit livetes de Sandras..	14.00
Huet, quatre trébuchets pour peser..	32.00
Huet, trois livres de cire à cacheter..	18.10
Huet, quatre trebuchets pour peser..	32.00
Berichon, quinze ardoises (mémoire)..	18.00
Desautels, un trictrac..	20.10
Desautels, un trictrac..	22.10
Le Guay, un trictrac..	21.00
Desautels, un trictrac..	22.00
Jautard, un trictrac..	19. 5
Huet, quatorze estampes encadrées..	29.00
Huet, quatre écritoirs de pierre..	4.00
Huet, deux couteaux d'hivoire pour papier..	8.00
Desautels, trois sabliers de bois..	7.10
Jautard, un étui de mathématique..	9.00
Jautard, un étui de mathématique..	15.00
Le Guay, un étui de mathématique..	21.00
Huet, dix-neuf livres petits, reliés..	10.00
Desautels, quarante-six petits livrets..	5.00
Le Guay, quatre petits cartiers..	3.12
Huet, sept cahiers petits..	3.00
Huet, soixante-sept petits cornets blancs, couverts en bleu.. . .	3.10
Desautels, dix tablettes couvertes de maroquin..	20.10
Desautels, trois porte-feuilles garnis..	15.00
Jautard, trois grands porte-feuilles..	7.00
Le Guay, cinquante estampes..	9.00
Desautels, huit cent Journée du Chrétien, en feuilles	26.00
Desautels, cinq cent St-François Xavier, en feuilles.. . . .	3.10
Desautels, sept cent St-Antoine, en feuilles..	3.10
Desautels, cent vingt Semaine Sainte, non reliés..	9.00
Desautels, quarante anecdotes français et anglais..	25.00
Desautels, trois cent Ange Gardien..	3.10

Desautels, trois cent alphabets.. . . .	3.10
Desautels, deux cent règles de psaumes, sans reliures.. . .	9.00
Desautels, quatre-vingts formulaires de prières, sans reliures.. .	31.00
Desautels, trois cent psautiers, sans reliures.. . . .	4.10
Jautard, une table de quatre pieds de noyer, avec un tiroir.. .	9.10
Desautels, une petite chaudière.. . . .	6.00
Huet, un bureau avec tiroir.. . . .	101.00
Desautels, une imprimerie complète avec deux presses et ses ustensils.. . . .	1700.00
Huet, un poêle de fer, palmier avec tuyau, aucune mode.. .	60.00
Jautard, un coffre de voyage.. . . .	30.00
Huet, un petit buffet.. . . .	14.00
Jautard, sept caisses bouquets de fleurs.. . . .	7.10
Desautels, un poêle de fer avec tuyaux de l'ancienne mode.. .	51.00
Fleury, une petite table.. . . .	7. 5
Jautard, une volière.. . . .	18.00
Desautels, une cabane d'écureuil.. . . .	16.00
Huet, un petit poêle.. . . .	64.00
Jautard, une horloge.. . . .	37.00
Jautard, huit chaises pailées.. . . .	8. 5
Fleury, une chaudière.. . . .	9.10
Dupré, une marmite de fer	4.12
Dupré, une petite marmite.. . . .	2. 1
Dupré, deux poêles fuzer moyenne.. . . .	5. 1
Jautard, une petite coquille de fer.. . . .	3.00
Desautels, une vache sous poil noir.. . . .	48.10
Jautard, une petite génisse.. . . .	20.00
Huet, une fontaine fer blanc.. . . .	10.00

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Montant de la vente Cy 152.11.4.

JOSEPH MARY DESAUTELS,
L. GARNOT,
FR. LE GUAY.

Et n'ayant plus rien à vendre suivant le procès-verbal de saisie remis en mains de l'huissier qui a signé ces présents, nous nous sommes retiré et à aussi le dit requéreur signé avec notaire au jourd'hui, quatre heures et demi du jour sus-dit.

A. FAUCHER, Notary.

No. 62.

Lease from J. B. Tabeau to F. Mesplet.

Pardevant, etc.,

14 April, 1788.

Fut présent Sieur Jean Baptiste Tabaux, ancien marchand voyageur, demeurant en cette ville, rue Notre-Dame.

Lequel a fait bail a loyer à prix d'argent pour le terme et espace d'une année entière et révolue et promet durant le dit temps garantir et faire jouir à sieur Fleury Mesplet, marchand imprimeur, demeurant en cette dite ville et à ce présent et retenant—pour lui au dit titre pour l'espace d'une année une maison de pierre size au dit lieu, rue Notre-Dame, jardin

et dépendances, le tout joignant d'un côté le sieur Vallée et d'autre le sieur Lardy. Le tout en bon état et exempt de réparation que le dit sieur preneur dit bien savoir le connaître pour avoir le tout vu et visité et dit en être content; pour du tout jouir par le dit sieur preneur pleinement et paisiblement en toute propriété à l'exception des fruits, des arbres plantés dans le jardin que lesquels ont réservé par ces présentes le droit d'exiger dans la saison un quart de pommes à choix à prendre sur les arbres.

Ce fut fait à la charge par le sieur preneur d'entretenir la dite maison et dépendances en bon et semblable état que le tout lui sera livré au premier mai prochain pour finir à pareil terme au bout de l'an aux charges de toutes réparations locatives, à la réserve des fruits des arbres qui sont dans le jardin, exception comme dit est d'un quart de pommes au choix du dit sieur preneur, en outre pour et moyennant le prix et somme de huit cent shélins ancien de la province, exigibles par quartier à l'échéance de chacun, sans pouvoir le dit sieur preneur céder son droit au présent bail à personne quelconque sans l'agrément par écrit du dit sieur bailleur.

Car ainsi, etc., et pour l'exécution des présentes, le dit sieur preneur a élu son domicile en la susdite maison louée, auquel lieu, etc., nonobstant, etc., promt., etc., obligt., etc., renonct, etc.

Fait et passé à Montréal, en l'étude l'an mil sept cent quatre-vingt-huit, le quatorze avril avant-midi, et ont les parties signé avec Nores, lecture faite.

(Signé) BAPTISTE TABEAUX,
FL. MESPLET,
F. LE GUAY, N.,
A. FOUCHER, Nore Royal.

No. 63.

Engagement of Alex Gunn as apprentice by Mesplet.

Par devant les notaires de la ville de Montréal, dans la province de Québec y résidant soussignés,

Fut présent Mr. William Gunn, maître d'école demeurant en cette ville, rue St. Sacrement, lequel pour faire le profit et avantage d'Alexandre Gunn, son fils, âgé de quinze ans, qu'il certifie fidèle, l'a mis de ce jour en apprentissage pour le terme et espace de cinq années finies et accomplies en qualité de garçon imprimeur, à Mr. Fleury Mesplet, imprimeur, demeurant aussi en cette ville, rue Notre-Dame, à ce présent et retenant le dit Alexandre Gunn en la dite qualité, promettant le dit Mr. Mesplet enseigner et montrer au dit apprenti sa dite profession, et tout ce dont il se mêle en icelle, loger coucher, chauffer et l'entretenir de hardes, nourrir et blanchir, et le traiter convenablement en santé et en maladie, promettant le dit sieur Mesplet de permettre au dit Alexandre Gunn, son apprenti, toutes fois qu'il n'en aura pas besoin d'aller chez le dit sieur son père, pour y prendre des leçons d'écriture et d'arithmétique et de l'occuper lui-même dans les dites branches de son éducation, quand le tems lui permettra. A ce faire était présent le dit Alexandre Gunn qui a eu tout ce que dessus pour agréable, et a promis et promet servir et obéir fidèlement au dit sieur son maître, et exécuter fidèlement tout ce qu'il lui com-

mandera de licite et honnête, faire son profit, éviter son dommage, l'en avertir s'il vient à sa connaissance et faire généralement tout ce qu'un bon et fidèle apprenti doit et est obligé de faire, sans pouvoir s'absenter ni quitter le dit apprentissage sous peine de rendre le temps qu'il aurait perdu par sa faute à l'expiration des présentes, auquel cas le dit sieur, son père, promet le chercher et ramener au dit sieur, son maître pour parachever le temps qui pourrait rester pour compléter le présent brevet d'apprentissage promettant le dit sieur Mesplet donner au dit apprenti à l'expiration des présentes un habillement neuf complet. Car aussi et promettant, et obligeant, et renonçant, etc.

Fait et passé à Montréal en l'étude de notaire l'an mil sept cent quatre-vingt-neuf, le cinq de décembre, après-midi, ont signé lecture faite,

WM. GUNN,
ALEX. GUNN,
F. MESPLET,
JOS. PAPINEAU,
JEAN GUIL. DELISLE.

No. 64.

Marriage Contract between F. Mesplet and Marie Anne Tison.

11th April, 1790.

Par devant les notaires de la ville de Montréal, dans la province de Québec, y résidants soussignés,

Furent présents Mr. Fleury Mesplet, imprimeur, demeurant en cette ville, en sa maison sise rue Notre-Dame d'une part; et demoiselle Marie Anne Tison majeure, usante de ses droits. D'autre part, lesquelles parties du consentement de leurs parents et amis ci-après nommés; savoir de la part du dit sieur Mesplet; de sieur Joseph Desautelles, sieur Francis Le Guay, ses amis, et de la part de la dite demoiselle Tison, du sieur Jean Baptiste Tison, son père, de De Magdelaine Le Guay, épouse du dit sieur Tison sa belle-mère, de Jean Baptiste Tison fils, son frère; Marie Anne Desloriers, épouse du dit sieur Tison, fils de sa belle-soeur; Madame Catherine Biron, épouse de sieur François Tison, aussi son frère; de dame Louise Viger, épouse du sieur Joseph Dessautelles, sa tante.

Ont volontairement reconnu et confessé avoir fait et accordé entre elles les traités de mariage et conventions suivantes, savoir que le dit sieur Fleury Mesplet et la dite demoiselle Marie Anne Tison se sont promis et promettent par les présentes de se prendre l'un et l'autre pour mari et femme et légitimes époux par lois et nom de mariage et en faire solemniser le dit mariage en face de notre mère Ste. Eglise Catholique Apostolique et Romaine le plutôt que faire se pourra et qu'il sera avisé et délibéré entre leurs parents et amis.

Seront les dits futurs époux uns et communs en tous biens, meubles et conquets immeubles, suivant la coutume de Paris, conformément à laquelle ils veulent et entendent que leur communauté et autres conventions matrimoniales, soient réglées, dérogeant et renonçant expressément à toutes autres coutumes, lois et usages contraires encore qu'ils transportassent leur domicile et fissent des acquisitions ailleurs.

Ne seront néanmoins tenus des dettes de l'un de l'autre faites et créées avant la célébration du dit mariage, lesquelles seront payées et acquittées

par celui ou celle qui les aura faites et créées et sur son bien sans que l'autre ni ses biens en soient aucunement tenus en quelque manière que ce soit.

Déclarent les dites parties que leurs biens et droits sont comme suit; savoir: De la part de la dite demoiselle future épouse d'une somme de trois mille vingt-deux livres dix sols shellings ancien cours de cette province, laquelle somme lui est propre comme provenant de la succession de feu dame Marie Anne Hupé Picard, sa mère, laquelle somme est actuellement entre les mains du dit sieur Jean Batiste Tison, son père; qu'il promet lui bailler et payer dans le cours d'une année à compter du jour qu'elle lui en fera la demande, et dont il lui payera l'intérêt à raison de cinq par cent, jusqu'au jour de l'actuel et dernier paiement, à compter de ce jour. Ceux du futur époux en une somme de quatre mille livres pareil cours comme provenant de ses conquets. Lesquelles sommes sortiront nature de propre de chaque côté aux dits futurs époux et aux heures de leurs côtés et lignes.

Le dit futur époux a doué et doue la dite future épouse du douaire coutumier ou—de la somme de mille livres ou schellings ancien cours de la province de douaire préfix à prendre sur tous et chacun des biens, meubles et immeubles, présents, et à venir du dit futur époux, qu'il en a dès à présent chargé, affecté, obligé et hypothéqué à garantir et faire valoir le dit douaire; pour du dit douaire coutumier ou préfix tel qu'il sera choisi par la dite future épouse, en jouir par elle dès que douaire aura lieu sans qu'elle soit tenue de le demander en justice.

Le survivant des dits futurs époux aura et prendra par préciput, hors part et sans confusion des biens de la dite communauté jusqu'à la somme de cinq cents livres ou schellings ancien cours de la province en meubles suivant la prise de l'inventaire qui en sera fait sans crue, ou la dite somme en deniers contents au choix du dit survivant et en outre leurs habits et hardes d'habillements à l'usage du dit survivant et leurs lits et chambres garnis tels qu'ils seront lors de la confection de leur inventaire.

Arrivant la dissolution de la dite communauté sera libre à la dite future épouse et aux enfants qui naîtront du dit mariage d'accepter icelle ou d'y renoncer et en cas de nomination à la dite communauté elle pourra reprendre franchement et quittement, tout ce qu'elle aura apporté lui sera venu et échu par successions, donations, legs ou autrement avec ses douaire préciput, ses habits, linges et autres hardes d'habillement à son—usage et son lit et chambre garni comme dessus sans être tenue d'aucune dette ni hypothèque faites et créées pendant la dite communauté, quoiqu'elle s'y fut obligée ou qu'elle y eut été condamnée, dont elle sera acquittée par le dit futur époux et sur ses biens d'icelui ou par ses héritiers, et pour laquelle reprise et indemnité elle aura son hypothèque dès ce jour sur tous les biens présents et à venir du dit futur époux de quelque nature qu'ils soient.

En considération du dit futur mariage et pour l'affection et l'amitié que se portent les dits futurs époux l'un à l'autre ils se sont par les présentes fait donation viagère égale et réciproque au survivant et eux ce acceptant tous et chacun ses biens meubles et immeubles tant propres qu'acquets et conquets qui appartiendront au premier mourant aux jour et heure de son décès à quelques sommes qu'il se puissent monter et de quelque nature qu'ils soient, en quelque lieu qu'ils se trouvent, sans en retenir ou

excepter aucune chose, pour de tous les dits biens tant propres qu'acquets et conquets jouir par le survivant sa vie durant sans qu'il soit tenu de donner aucunes cautions sinon à sa juratoire.

La dite donation mutuelle ainsi faite pourvu et à la charge qu'il n'y ait aucun enfant vivant ou à naître en légitime mariage auquel cas demeurera la présente donation nulle de plein droit; et en cas qu'il y eut des enfants et qu'ils vinssent à décéder avant l'âge de majorité ou d'être pourvus par mariage—les dits futurs époux veulent et entendent que la dite donation reprendra sa force et vigueur.

Et pour faire insinuer les présentes au greffe des insinuations de cette province et partout ailleurs ou besoin sera les dits futurs époux ont fait et constitué leur procureur général et spécial le porteur des présentes; auquel ils ont donné et donnent tout pouvoir d'en requérir acte; car ainsi a été convenu et accordé entre les parties et pour l'exécution des présentes les dites parties ont élu leur domicile en leur demeure ci-dessus désignée auquel lieu, etc., nonobstant, etc., promettant, etc. Chacun en droit soit et renonçant, etc.—Fait et passé au dit Montréal en la maison du dit sieur Jean Baptiste Tison, père, l'an mil sept cent quatre-vingt-six, le onze d'avril après-midi et ont signé lecture faite.

(Signé) TISON,
FLEURY MESPLET,
MADELAINE LEGUAY,
TISON,
JOSEPH DESAUTELS,
JEAN BAPTISTE TISON, fils,
LOUIS VIGE,
LEGUAY,
MARIE-ANNE TISON,
A. FOUCHER, Nore Royal,
JEAN GUILLAUME DELISLE, N. P.

No. 65.

Obligation or bond from F. Mesplet to Charles Lusignan.

20 Décembre 1790.

Par devant les notaires de la ville de Montréal, dans la province de Québec y résidant soussignés,

Furent présents sieur Fleury Mesplet, imprimeur, demeurant en sa maison No. 44, size en cette ville, rue Notre-Dame et de Marie-Anne Tison, son épouse, qu'il autorise à l'effet des présentes. Lesquels ont reconnu et confessé devoir bien légitimement à Monsieur Charles Lusignan, négociant de cette ville y demeurant rue St. François, à ce présent et acceptant la somme de onze cent soixante-quatre livres sept sols, ou shellings, ancien cours de cette province, pour prêt de pareille somme que le dit sieur créancier leur a ci-devant fait en or et argent ayant cours en cette province, dont les dits sieur et dame débiteurs sont contents et satisfaits; promettant et s'obligeant solidairement l'un pour l'autre un d'eux seul pour le tout, sans divison, discussion ni fidiussion, renonçant au dit bénéfice, de rendre et

payer la dite somme de onze cent soixante-quatre livres, sept sols du dit cours, au dit sieur Charles Lusignan en sa demeure ou au porteur des présentes dans le cours d'une année à compter de la date des présentes avec les intérêts sur la dite somme à raison de six par cent, à peine de tous dépens, dommages et intérêts, auquel paiement les dits débiteurs affectent, obligent et hypothèquent sous la dite solidité tous leurs biens, meubles et immeubles présents et à venir sans qu'une obligation déroge à l'autre. Et pour l'exécution des présentes et dépendances, les dits sieur et dame débiteurs ont élu leur domicile en leur demeure ci-dessus désignée, auquel lieu, &c., promettant, &c., renonçant, &c., nobstant, &c., obligeant solidairement comme dessus, fait et passé au dit Montréal, en l'étude, l'an mil sept cent quatre-vingt-dix, le vingt décembre après-midi et ont signé lecture faite.

(Signé) FLEURY MESPLET,
MARIE-ANNE TISON MESPLET,
LUSIGNAN,
A. FOUCHER, Nore Royal,
JEAN GUILLAUME DELISLE.

No. 66.

Intervention of J. B. Tison in above bond.

Et le huitième jour de janvier mil sept cent quatre-vingt-treize, avant midi, est comparu devant les notaires, à Montréal, soussigné sieur Jean Baptiste Joseph Tison, me. perruquier, demeurant en sa maison sise en cette ville de Montréal, rue St. François Xavier; lequel a volontairement reconnu et confessé avoir entre ses mains, appartenant à dame Marie-Anne Tison, épouse du sieur Fleury Mesplet, imprimeur de cette ville, tous deux à ce présente et de leur consentement, une certaine somme d'argent excédant la somme de onze cent soixante-quatre livres sept sols, shellings de vingt coppres, mentionnés dans l'obligation ci-devant écrit et des autres parts comme provenant des droits échus à la dite dame Mesplet, dans la succession de feu dame Marie-Anne Picard, sa mère, et pour plus grande sûreté de la dite somme de onze cent soixante-quatre livres sept sols susmentionnée; le dit sieur Jean Baptiste Tison s'être par les présentes volontairement rendu pleige et caution envers le sieur Charles Lusignan, négociant de cette ville, créancier dénommé en la présente obligation à ce présenter et acceptant, et le dit sieur Tison s'est obligé solidairement sous les renonciations de droits accoutumés conjointement avec les dits sieurs et dame débiteurs et y affecte et oblige tous ses biens, meubles et immeubles présents et à venir, sans qu'une obligation déroge à l'autre à la charge de par le dit sieur Lusignan ainsi qu'il s'y oblige par les dites présentes et durant deux années à compter de la date des présentes au dit sieur Jean Baptiste Tison pour payer la dite somme de onze cent soixante-quatre livres sept sols, et dont les dits sieur et dame Mesplet en décharge d'autant le dit sieur leur père et beau père.

Dont acte requis et octroyé à condition toutefois que l'intérêt actuellement dû sur la somme principale et celles qui pourront être dûes à l'avenir seront payées par les dits sieur et dame Mesplet au dit sieur Lusignan

sans que le dit sieur Tison en soit recherché. Fait et passé à Montréal en l'étude de Jean Guillaume Delisle, l'un des notaires soussignés, les jour et an que dessus, et ont signé lecture faite,

(Signé) TISON,
FL. MESPLET,
MARIE-ANNE TISON,
LUSIGNAN,
A. FOUCHER, Nore Royal,
JEAN GUILLAUME DELISLE.

No. 67.

Discharge of above bond.

Et le onzième jour de décembre mil sept cent quatre-vingt-quinze avant-midi, est comparu devant les notaires à Montréal, soussignés le sieur Charles Lusignan, négociant de cette ville, créancier dénommé aux actes obligatoires ci-devant écrits et des autres parts; lequel a reconnu et confessé par ces présentes avoir eu et reçu de Mr. Jean Baptiste Joseph Girou aussi dénommé au cautionnement ci-contre écrite à ce présent. Le somme de onze cent soixante-quatre livres, sept sous ou shellings de vingt coppres, avec les intérêts sur la dite somme, calculé jusqu'à ce jourd'hui, dont il tient quitte et bien valablement déchargé le dit sieur Girou ainsi que tous autres du passé jusqu'à ce jourd'hui; à ce faire était présente dame Marie-Anne Tison, veuve de feu Fleury Mesplet, imprimeur, laquelle a reconnu par ces présentes tenu quitte et bien valablement déchargé le dit sieur Tison, son père, de la dite somme de onze cent soixante-quatre livres et sept sols, avec les intérêts. En déduction de ses droits et prétentions dans la succession de feu dame Marie-Anne Bréard, sa mère, la dite somme provenant de ses propres à elle appartenante et expressément réservé par son contrat de mariage avec le dit feu sieur Mesplet, et qui était demeuré en mains du dit sieur Tison, son père. Dont acte requis et octroyé à Montréal, en l'étude des jour et au susdits et ont signé lecture faite.

LUSIGNAN,
VEUVE MESPLET,
P. LUKIN, N. P.,
JEAN GUILLAUME DELISLE.

No. 68.

Lease from widow Ignace Chenier of a house to Mesplet.

26 March, 1793.

Par devant les notaires de la ville de Montréal dans la province du Bas Canada, soussignés,

Fut présent sieur Ignace Souigny, capitaine de la milice, demeurant à Longue Pointe, curateur élu en justice à dame Josephthe Aubuchon, veuve de Sr. Ignace Chenier lequel a reconnu et confessé par les présentes avoir fait bail a loyer pour le temps et espace de cinq années consécutives à

commencer du premier jour du mois de mai prochain et promet faire jouir durant le temps au dit titre au sieur Fleury Mesplet, imprimeur, demeurant en cette dite ville, à ce présent et acceptant preneur pour lui au dit titre de loyer, savoir: une maison sise et cette ville, rue Notre-Dame, avec la cour et bâtiments en dépendant, tenant par derrière au terrain de sieur Etienne Campion, d'un côté aux héritiers Hardy et d'autre côté au dit sieur Campion. La dite maison garnie de toutes ses portes pleines contrevents et châssis vitrés de laquelle le dit sieur preneur se contente disant la bien savoir et connaître pour l'avoir vue et visitée et en est satisfait promettant la rendre et remettre en même et semblable état qu'il l'aura reçue à l'expiration des présentes.

Le présent bail aussi fait aux clauses et conditions susdites et en outre pour et moyennant la somme de six cent livres ou shillings de vingt coppres de loyer pour chaque année que le dit sieur preneur promet et s'oblige payer en quatre payments égaux à raison de cent cinquante livres par chaque dit payment et de trois mois en trois mois au dit sieur Souigny, curateur ou au porteur des présents et dont le premier quartier sera dû et échu le premier jour d'août prochain et aussi continuer de quartier à autre jusqu'à l'expiration des présentes à peine de toutes dépenses, dommages et intérêt, et en outre à la charge de par le dit preneur entretenir la dite maison et lieux en même état semblable qu'il la reçoit actuellement et d'y faire les réparations locatives sans pouvoir céder ni transporter son droit au présent bail en tout ou partie sans le consentement exprès du dit sieur bailleur, qui promet de sa part le tenir clos et couvert dans la dite maison et lieux en dépendant suivant la coutume.

Sont convenues les dites parties que le présent bail n'existe qu'autant que la dite dame veuve Chenier demeurera sous sentence d'interdiction, aussi qu'elle se trouve actuellement ou autant de temps qu'elle sera vivante et dans les deux cas seulement le présent bail au bout de l'année que restera lors à expirer demeurera nul et révolu. Sont au dit sieur preneur à se soumettre à ce qui sera demandé à cet égard par les héritiers Chenier et Aubuchon ou à faire de nouveaux arrangements avec eux.

Convienne aussi les parties de se prévenir mutuellement trois mois avant l'expiration des dites cinq années de bail si autant il dure afin qu'il puisse savoir s'il faudrait dans le temps d'autres arrangements et savoir réciproquement s'il prendrait un autre bail pour un plus long espace de temps.

Et pour l'exécution des présentes et de leur dépendances les dites parties ont élu leur domicile en leurs demeures ordinaires, auxquels lieux, etc., promettant, etc., obligeant, etc., renonçant, etc., chacun en droit soi etc., renonçant, etc., fait et passé au dit Montréal en l'étude de Jean Guillaume Delisle, l'un des notaires soussignés l'an mil sept cent quatre-vingt-treize, le 26 mars après-midi, et ont signé à l'exception du dit sieur Souigny qui ayant déclaré ne le savoir faire de ce enquis à fait sa marque ordinaire lecture faite.

FL. MESPLET,
IGNACE X SOULIGNY,
JEAN GUILLAUME DELISLE,
LOUIS THIBAudeau, N. P.

No. 69.

Obligation or bond from Mesplet to J. B. Durocher for £130.08—\$632.83.

26 July, 1793.

Par devant les Notaires de la ville de Montréal, dans la province du Bas-Canada, y résidant soussignés,

Furent présents sieur Fleury Mesplet, imprimeur en cette dite ville y demeurant, rue Notre-Dame, et de Marie-Anne Tison, son épouse qu'il autorise à l'effet des présentes; lesquels ont volontairement reconnu et confessé devoir bien légitimement à sieur Jean Baptiste Durocher, Ecuyer, négociant, demeurant en la maison sise en cette dite ville aussi, rue Notre Dame, à ce présent et acceptant la somme de cent-trente livres, et huit pence sterling pour autant en effets et marchandises, caractères et autres effets d'imprimerie que le dit Pierre Durocher leur aurait fait venir d'Europe cette année et dont il est content et satisfait; promettant les dits sieur Mesplet et son épouse solidairement l'un pour l'autre un d'eux seul pour le tout sans division, discussion, ni fidéjussion renonçant au dit bénéfice, payer la dite somme de cent trente livres et huit pence sterling au dit sieur Jean Baptiste Durocher, Ecuyer, ou au porteur comme suit, savoir: cinquante livres du dit cours le sixième jour d'octobre de la présente année et les quatre-vingts livres et huit pence restants pour parfaire la dite somme à la demande et réquisition du dit sieur Durocher avec l'intérêt légitime jusqu'au parfait paiement; promettant le dit sieur créancier autant que faire se pourra ne point gêner les dits sieur et dame débiteurs, et recevra telle partie du paiement de la somme restante que les dits sieur et dame Mesplet lui offriront et les intérêts diminueront en conséquence.

Et pour sûreté de laquelle somme de cent trente livres et huit pence sterling susdite, les dits sieur et dame Mesplet ont hypothéqué et par les présentes tous leur biens, meubles et immeubles présents et à venir et particulièrement la dite dame Mesplet ses droits et prétentions dans la succession du feu dame Tison, sa mère, une obligation ne dérogeant à l'autre. Et pour l'exécution des présentes et de leurs dépendances les dits débiteurs ont élu leur domicile en leur demeure ordinaire, auxquels lieux, etc., obligeant, etc., renonçant, etc., auxquels

Fait et passé au dit Montréal, en l'étude de L. J. Delisle, l'un des notaires soussignés,

L'an mil sept cent quatre-vingt-treize, le vingt-six de juillet après-midi, et ont signé lecture faite.

(Signé) J. B. DUROCHER,
MARIE ANNE TISON,
MESPLET,
PRE. GAUTHIER, Nre.,
JEAN GUILLAUME DELISLE.

No. 70.

Compromise and substitution of J. B. Tison in above bond.

Et le onzième jour de décembre mil sept cent quatre-vingt-quinze avant-midi, est comparu devant le notaire à Montréal soussigné, dame Marie-Anne Tison, veuve de feu Fleury Mesplet de son vivant imprimeur, en cette ville; laquelle a dit et déclaré que s'étant obligé solidairement avec le dit feu sieur

son époux, pour le montant d'une certaine somme mentionnée en l'obligation de l'autre part, pourquoi les biens propres se trouveraient affectés envers Jean Baptiste Durocher, créancier aussi y dénommé, au présent et acceptant. Et voulant autant qu'il est en son pouvoir satisfaire à cette obligation, elle confesse et déclare par ces présentes, qu'il lui appartiendrait une somme de soixante-sept livres, un shelling et neuf pence sterling comme provenant de la succession de feu dame Marie-Anne Priard, sa mère, actuellement entre les mains de sieur Jean Baptiste Joseph Tison, son père, pourquoi elle substitue le dit sieur Durocher en son lieu et place, noms, droits, raison et action pour recevoir et percevoir du dit sieur son père, la dite somme sus-mentionnée, pour demeurer quitte à son égard seulement envers le dit sieur Durocher sans préjudice à ses droits et demandes contre la succession vacante du dit feu Mesplet, son époux, et dont le dit sieur Durocher s'est tenu pour content.

A ce faire était présent le dit sieur Jean Baptiste Tison, père, qui a eu le présent transport pour agréable et se l'est tenu pour bien et duement signifié; et le dit sieur Durocher ne voulant point inquiéter le dit sieur Tison pour le paiement de la dite somme de soixante-sept livres un shelling et neuf pence sterling, a dit et déclaré par les présentes, qu'il accorde au dit sieur Tison un délai de deux années à compter de ce jourd'hui, pour le paiement de la dite somme avec l'intérêt à raison de six par cent annuellement; payable en un seul ou plusieurs paiements tant en capital qu'intérêts à la volonté du dit sieur Tison, qui pour l'exécution des présentes, a élu son domicile en la demeure actuelle au Coteau St. Louis près cette dite ville, auquel lieu, etc., promettant, etc., obligeant, etc., renonçant, etc. Fait et passé au dit Montréal, en l'étude les jour et an susdits, et ont signé lecture faite.

(Signé) VEUVE MESPLET,
J. B. DUROCHER,
TISON,
P. LUKIN, N. P.,
JEAN GUIL. L. DELISLE, N. P.

No. 71.

Transfer to Pierre Huguet dit Latour of above bond.

Et le vingtième jour de mars, mil sept cent quatre-vingt-dix-sept, avant-midi. Est comparu devant les notaires à Montréal, soussignés, Jean Baptiste Durocher, Ecuyer, dénommé en l'acte ci-devant écrit et des autres parts, créancier y mentionné; lequel a par ces présentes, transporté sans aucune autre garantie que de ses faits et promesses seulement à sieur Pierre Huguet dit Latour, demeurant en cette ville, à ce présent et acceptant, la somme de soixante-sept livres, un shelling et neuf pence sterling à lui due par dame Marie-Anne Tison, veuve de Fleury Mesplet, à prendre sur les argents à elle appartenant entre les mains de sieur Jean Baptiste Joseph Tison, son père, et par lui payable dans le délai de deux années avec les intérêts stipulés ci-devant. Lesquels dits intérêts le dit sieur Durocher transporte également au dit sieur Huguet dit Latour; payable la dite somme en un ou plusieurs paiements ainsi que décrit et dont le dit sieur Huguet s'est tenu pour content et satisfait. Et pour faire signifier les présentes au dit sieur Tison, les parties ont constitué leur procu-

reur le porteur leur donnant tout pouvoir, reconnaissant le dit sieur Durocher, avoir reçu paiement et satisfaction du dit sieur Huguet, pour pareille somme de soixante-sept livres, un shelling et neuf pence avec les intérêts échus et à écheoir, dont quittance et ont signé à Montréal en l'étude les jour et an susdits.

(Signé) J. B. DUROCHER,
P. HUGUET LATOUR,
P. LUKIN, N. P.,
JEAN GUIL. DELISLE, .N P.

No. 72.

Discharge of above bond.

Aujourd'hui est comparu devant les notaires à Montréal, soussignés sieur Pierre Huguet La Tour, demeurant en cette ville, mentionné en l'acte de transport du vingt mars mil sept cent quatre-vingt-dix-sept, porté à la suite de l'obligation ci-contre et des autres parts; lequel a reconnu et confessé avoir eu et reçu de Mr. Jean Baptiste Joseph Tison, père; aussi dénommé au dit acte, la somme de soixante-sept livres un shelling et neuf pence argent sterling de la Grande Bretagne, avec les intérêts sur la dite somme calculée jusqu'aujourd'hui au moyen de quoi le dit sieur Tison demeure quitte et bien valablement déchargé ainsi que tous autres.

Dont acte requis et octroyé à Montréal, en l'étude le vingt-deux novembre, mil sept cent quatre-vingt-dix-sept avant-midi, et a signé avec nous notaires lecture faite.

P. HUGUET LATOUR,
P. LUKIN, N. P.,
JEAN GUIL. DELISLE.

No. 73.

Inventory of stock and furniture of the late Fleury Mesplet.

17 to 20 February, 1794.

L'an mil sept cent quatre-vingt-quatorze, le dix-septième jour de février avant-midi, à la requête de dame Marie-Anne Tison, veuve de sieur Fleury Mesplet, imprimeur, demeurant en cette ville, rue Notre-Dame, tant en son nom que comme commune en biens avec le dit défunt son époux, sauf à elle à accepter ou à renoncer à la dite communauté, ainsi qu'il avisera par conseil; à la conservation des biens et droits de qui il appartiendra, par les notaires soussignés pour la province du Bas-Canada, résidant à Montréal, a été fait inventaire et description de tous les biens, meubles ustensils de ménage, habits, linges, hardes, titres et papiers enseignements et autres effets demeurés après le décès du dit sieur Fleury Mesplet et qui étaient communs entre lui et sa dite veuve au jour de son décès, trouvés en la maison ou la dite veuve est demeurante, en laquelle le dit Fleury Mesplet est décédé le vingt-quatrième jour de janvier dernier montrés et enseignés aux dits notaires par la dite Marie-Anne Tison, après serment par elle prêté aux dits notaires de montrer et enseigner tous les dits biens, sans en cacher ni détourner aucune chose, se promettant où ils se trouveront le contraire aux peines en tels cas introduits, qui lui ont été exprimés

par les dits notaires, aux biens, meubles, prisés et estimés dans leur pleine et entière valeur par Messieurs Louis Hardy et Charles Lusignan, qui les ont prisés et estimés en leur âme et conscience en égard au temps présent, ainsi qu'il suit et ont signé lecture faite,

(Signé) TISON MESPLET,
LOUIS HARDY,
LUSIGNAN,
LS. CHABOILLEZ,
JEAN GUIL. DELISLE, N. P.

Premièrement dans la cuisine:

Un tournebroche..	cy	24.00
Une cramayère..		1.10
Un fer de chenets..		4.00
Quatre marmites ensemble..		18.00
Une pince, une pelle à feu..		3.00
Trois poêles à frire ensemble..		9.00
Un poids de quatorze livres et un sept livres ensemble		3.10
Une tourtière de cuivre rouge..		6.00
Une tourtière de fer..		3.00
Trois petits trépieds		2.00
Deux grils ensemble..		2.00
Une broche pour le tournebroche..		3.00
Une cramayère, une barre de fer et deux crochets, le tout à dix francs..		6.00
Une casserole de cuivre..		6.00
Trois fers à flasquer..		6.00
Une loquète sur couvert, une terrine de fer blanc avec son couvert..		3.00
Une jarre..		12.00
Une soupière, un plat et un arrosoir de fer blanc..		4.00
Un moulin à poivre..		2.00
Une passoire de cuivre et un poëlon de cuivre..		6.00
Un canard de cuivre..		4.00
Une broche..		1.10
Quatre sceaux ferrés..		6.00
Un couteau à hacher et une sauce-panne, ensemble..		4.00
Six plats ovales..		4.00
Une soupière..		4.10
Trois chandeliers de cuivre..		9.00
Un martinet et deux porte-mouchettes		4.00
Un pilon de fer..		4.00
Une fontaine de fer blanc et son bassin..		12.00
Trois égohines..		12.00
Une cuillère à pot et son écumoir..		2.00
Une petite laiterie		2.00
Un pré de balance de fer blanc..		4.00
Un moulin à café..		6.00

Deux boîtes de fer blanc..	cy	4.00
Un petit buffet avec sallet..		12.00
Une table et son tiroir..		3.00
Une caisse..		1.00
Cinq cadres..		3.00
Un billot..		1.00

Dans la chambre:

Neuf chaises peinturées en bleu..	cy	8.00
Six chaises tournées..		18.00
Huit chaises vertes..		48.00
Une armoire de noyer..		12.00
Une armoire de pin..		8.00
Une table de noyer..		9.00
Trois jalousies..		9.00
Un miroir doré..		12.00
Quatre cadres..		12.00
Quatre images..		1.10
Un coffre avec un tiroir..		12.00
Une canne à poignée de cuivre..		6.00
Un lit consistant en une paillasse, deux matelas, une paire de draps, sa couverture et la couchette avec le tour de lit complet..	mémoire	
Six tasses à café avec le sucrier..		3.00
Une montre avec sa boîte..		60.00

Dans un coffre se sont trouvées les hardes du sieur Mesplet:

Une redingotte de drap..	cy	24.00
Un habit vert et culotte de drap superfin couleur jaune..		72.00
Une veste verte de casimir brodé..		9.00
Un habit, une veste et culotte drap noir..		60.00
Une culotte drap noir..		9.00
Une veste de taffetas noir, une culotte de serge de Nimes..		12.00
Une veste satin broché..		15.00
Une veste de soie rayée..		6.00
Une robe de chambre et sa veste d'indienne..		4.10
Trois petits gilets de corvée, ensemble..		4.10
6 paires de bas de serge ensemble..		12.00
Un casque de marte avec sa boîte..		6.00
Un manchon de loup..		6.00
Six couteaux à manche argentés..		9.00
Six couteaux et six fourchettes à manche vert..		6.00
Quatre couteaux et quatre fourchettes à manche blanc..		1.10
Onze cuillères d'étain avec la boîte..		3.00
Cinq douz. et une assiette de gré		13.00
Trois saladiers..		3.00
Deux petits plats creux..		1.10
Deux sauciers et quatre salières avec un moutardier..		2.00
Cinq petites bolles de gré, ensemble..		2.00
Un pot au lait.. . . . .		.10

Deux grandes bolles..	cy	2.00
Deux petits plats longs..		1.00
Onze soucoupes et cinq tasses..		2.00
Trois pôts de terre jaune..		1.10
Un cabaret de Mohagony..		3.00

18 février 1794.

Un tableau pour les graines de Lion à un volume	cy	. 1
Deux apôtres avec le palmier..		3.00
Six cruches de 3 gallons de grès..		12.00
Six pôts de grès..		12.00
Six grandes images estimées..		6.00
Dix do passion..		9.00
Deux do passion..		1.00
Un chapeau..		6.00
Deux bolles..		1.10
Deux bonnets de coton..		1.10
Une robe de chambre Bregopion blanc..		18.00
Une robe de couverte..		12.00
Un fusil..		24.00
Un étui à rasoir et la pierre à huile, ensemble.. . . .		3.00
Cent cinquante-trois numéros de la Traduction de Burn's justice, à deux sols pièce, fait..		15.60
Treize paquets dont les noms des souscripteurs sont écrits dessus et qui doivent leur souscription..	mémoire	
Onze chemises estimées ensemble..		66.00
Douze calendriers..		6.00

Dans la salle:

Neuf verres à patte..	2.00
Sept gobelets..	2.00
Trois plus grands..	1.10
Deux patites carafes de chopine..	3.00
Une théière	1.10
Deux pots..	1.00
Une boîte de fer blanc..	1.10
Selze fioles..	4.00
Trois carafes, ensemble..	9.00
Huit nappes de Malaie et Russie, ensemble..	24.00
Cinq draps, ensemble..	12.00
Quatre serviettes..	1.00
Deux douz. de torchons..	6.00
Une bergère..	2.00
Un thermomètre..	9.00
Un baromètre..	18.00
Deux cadres Louis XVI et La Reine..	1.10
Deux tableaux du Roy et la Reine d'Angleterre, ensemble.. . .	12.00
Cinq grands cadres vitrés à sept livres pièce, fait.. . . .	35.00
Six moyens cadres vitrés..	24.00

Trois petits en maroquin..	6.00
Deux petits cadres différentes façons..	14.00
Six tasses et soucoupes..	4.00
Un miroir à cadre doré..	30.00
Louis XV à cheval..	3.00
Un dessus de porte peint..	3.00
Un pied d'égal..	1.10
Une table pliante..	24.00
Une pendule..	48.00
Un grand guéridon de Mohagony..	96.00
Une table de Mohagony avec son tiroir..	24.00
Un bureau de Mohagony..	96.00
Une petite table bleue avec son tiroir..	9.00
Un grand carnet d'étain avec un sablier de bois..	3.00
Huit brochets, à chapeaux..	4.00
Deux paires de rideaux avec quatre bagettes de fer et ses anneaux..	30.00
Un poêle de fer avec son recoude et huit feuilles de tuyaux..	120.00
Un chien de marbre..	3.00
Un trébuchet à peser l'onguent avec ses poids..	5.00
Deux arrosoirs de jardin..	6.00
Une chaise d'aisance..	6.00

Dans le boudoir:

Quatre paquets de petites heures commencée en feuille, estimés. cy	24.00
Deux paquets d'A B C français en feuille..	48.00
Une rape à tabac..	1.00
Un paquet de Burn's justice..	1.10
Deux paquets de feuilles de Ste-Famille..	6.00
Deux paquets en feuille de psautiers complets..	36.00
Une presse complète à papier..	18.00
Un calendrier avec son cadre.. . . . .	.15

Dans le magasin.

Trois chapeaux de castor à douze francs pièce, font.. cy	36.00
Un paquet de calendriers perpétuels..	12.00
Un paquet de Ste-Semaine..	6.00
Dix livres reliés de gazettes, six francs chaque..	60.00
Un volume des annales de Sainte, relié à..	12.00
Deux Burn's justice, demi reliure..	6.00
Un almanach royal..	3.00
Un dictionnaire français et latin..	6.00
Trois volumes de littérature..	9.00
Quatre volumes Triomphe de la Providence..	12.00
Amis des enfants..	2.00
Un	3.00
Un code militaire..	2.00
Un St-François Xavier, relié.. . . . .	.15
Sept St-François Xavier, demi reliure..	3.10

Dix livres de prières en sauvage..	6.00
Huit nouvelles méthodes pour le latin..	6.00
Douze rules and regulations for field exercises, à..	9.00
Un Paris en miniature..	1.10
Soixante-cinq psautiers, reliés..	33.00
Deux douz. et sept lettres de Cicéron, latin, le tout..	15.00
Dix phèdres latins..	3.00
Trente-cinq anecdotes en brochure..	9.00
Trente-cinq anecdotes en brochure..	9.00
Un plomb à papier.. . . . .	.15
Six douz. Sts. Anges, à trente sols la douz., font..	9.00
Un paquet de sentences..	6.00
Deux douz. et demi, Amis des Enfants..	12.00
Soixante-cinq A B C..	3.00
Cent quarante-cinq bastilles septentrionales, le tout à..	36.00
Trois cent douz. Easy Rules..	18.00
Vingt-trois constitutions françaises Droits de l'Homme, à..	12.00
Un livre de Prières anglais..	6.00
Six invocations du Bon Sens..	1.10
Huit Jonathas et David..	2.00
Quarante-six versifications françaises..	15.00
Un recueil de théologie.. . . . .	.15
Vingt-cinq ouvrages de la Valinière Cathéchisme, ensemble..	12.00
Sept vraie Histoire Chantante de la Valinière à..	3.00
Une Chronique des Rois de France..	1.10
Cinquante-quatre livres blancs..	5.08
Trente-deux Constitution Française..	12.00
Dix-huit Cathéchisme de la Confirmation, le tout à..	2.14
Un paquet de cantiques en feuille..	6.00
Un paquet de Discipline Militaire..	3.00
Un paquet de Messe de la Ste-Famille..	3.00
Un paquet A B C français..	15.00
Un paquet de..	3.00
Un paquet de Tableau des Rues..	1.10
Un paquet de lettres circulaires..	3.00
Trois paquets spelling books..	12.00
Un paquet de Guide de la Banque Anglaise..	6.00
Un paquet d'engagement..	1.10
Deux paquets de Vandarac..	6.00
Deux gravures en cuivre, une Vierge et Christ..	12.00
Un paquet de Dieu	6.00
Six paquets Exemples..	3.00
Le Bill de Québec..	1.05
Vingt-six mains de papiers..	18.00
Vingt paquets de papier à écrire..	18.00
Dix mains de papier commun..	5.00
Six mains de papier commun..	6.00
Dix-huit mains de papier commun..	18.00
Trente-six mains de papier bleu..	30.00
Un lot de mains de papier, le tout..	7.00
Douze mains de papier..	10.00

Vingt-une mains de papier rouge..	22.00
Six demi-mains papier Royale..	6.00
Deux mains de papier commun..	2.00
Quinze demi-mains de papier Grand Royal..	30.00
Une rame de papier à lettre doré, contenant quarante cahiers..	18.00
Quatre cahiers à lettre uni..	3.00
Dix mains à peu près de papier marbré, grand, à..	10.00
Neuf mains de papier plus petit à..	9.00
Une boîte pleine d'oublies..	12.00
Dix-huit boîtes remplies d'oublies..	18.00
Quatorze cent plumes à écrire à..	42.00
Quatre douz. et trois crayons..	12.00
Trois paquets de poudre à encre rouge..	2.00
Quatre paquets de poudre à encre noire..	2.00
Quatre fioles encre rouge préparée..	4.16
Onze paquets grandes cartes blanches..	6.00
Treize règles rondes..	4.00
Quinze paquets petites cartes blanches..	2.08
Neuf sabliers..	4.10
Cinq cornets de papier..	2.10
Six cornets de cire..	6.00
Cinq cornets de cuivre..	5.00
Un cornet d'étain quarré..	3.00
Un cornet rond..	1.00
Trois livres de cire à cacheter noire..	18.00
Sept livres de cire à cacheter rouge..	42.00
Vingt-trois bâtons différentes couleurs..	6.00
Deux trébuchets de chagrin..	12.00
Deux trébuchets de Mahogany..	18.00
Cinq petites tablettes avec leur crayon..	9.00
Trois couteaux d'avoire à papier..	3.12
Deux porte-feuilles noirs..	4.00
Deux porte-feuilles Maroquin rouge..	8.00
Quatre vers à cornets..	7.00
Deux grands vers à cornets..	1.00
Six feuilles et deux morceaux de parchemin..	12.00
Une boîte avec un restant d'oublies..	1.10
Cinq timbres..	1.00
Une équerre et un graphomètre de cuivre..	1.10

Il s'est trouvé des livres appartenant à Edouard Guille. Gray, Ecuyer, qu'il avait donné à vendre au sieur Mesplet:

Un Missel..	
Six Rondots..	
Un Breviaire, 4 vols..	
Dictionnaire de 2 vols..	
Cinq Virgiles..	
Une Semaine Sainte..	
Un Diurnat..	
Trois manuels romains..	pour mémoire

Trois manuels romains, 5 vols..	cy	mémoire
Une seringue..		15.00
Deux paquets de gazettes..		3.00
Un livre anglais..10
Une petite boîte à Vandarac..10

19 février 1794.

Un pied de Roy..	cy	1.10
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Dans le haut de la maison:

L'imprimerie complète, ainsi qu'il est mentionné dans l'état remis par Edouard Guillaume Gray, Ecuyer, qui a prévenu qu'elle lui appartenait, l'ayant laissé à feu Mr. Mesplet pour s'en servir seulement et dont il sera seulement fait mémoire:

Une presse à relieure avec ses ustensils complets, ensemble..	cy	mémoire	100.00
Cinq paires de cases neuves, avec les couvertures neuves venus le printemps dernier d'Europe suivant la facture et en outre une paire de boîtes remplies de gros caractères, prisées et estimées le tout à..			1400.00
Un palmier poêle avec huit feuilles de tuyaux..			60.00
Un poêle à four..			60.00
Une gravure du Christ sur bois de Mahogany, à..			3.00
Un tuyau avec dix feuilles..			6.00
Une volière..			12.00
Deux cages..			6.00
Une cage..			1.00
Une chaudière cuivre jaune..			12.00
Une vieille valise..			1.10
Une boîte à chapeau.. . . . .			.10
Un coffre rempli de papier imprimé..			12.00
Une caisse remplie de papier imprimé..			6.00
Une caisse remplie de papier imprimé..			12.00
Une robe de boeuf..			12.00
Deux petites couvertes..			6.00
Trois traversins..			3.00
Un petit matelas..			8.00
Une robe de boeuf..			3.00
Deux petites couvertes..			6.00
Un petit lit de plume et son traversin..			12.00
Une paillasse et la couchette..			2.00
Un lit de quenouille, la paillasse..			6.00
Une table à tiroir..			12.00
Trois volumes de livres..			3.00
Deux caisses de ferrailles..			6.00
Deux caisses de ferrailles..			6.00
Deux caisses de ferrailles..			6.00
Une gravure en bois de Hastingson.. . . . .			.10
Une cage d'écureuil..			6.00
Deux oreillers..			6.00
Un bois de baudet..			1.10

Un vieux coffre..	1.00
Un vieux coffre..	1.00
Un bois de couchette.. . . . .	.15
Une vieille malle..	1.10
Quatre chassis..	9.00
Deux targettes à lit..	1.10
Un piège à rat..	3.00
Une presse à rouleau..	12.00
Deux côtés de cage grillé..	3.00
Un ciel de lit..	1.10
Une plaque de plomb..	3.00
Une paire de pinces..	1.10

Dans le bas:

Les tablettes, cloisons, et portes dépendants du magasin, ensemble..	12.00
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Dans la cave:

Une chaudière de cuivre..	12.00
Deux tinettes et une vieille chaudière de fer blanc..	1.00
Cinq cuves..	6.00
Une cuve de charbon..	4.00
Une canevette et huit flacons..	9.00
Un saloir..	1.10
Un grand coffre..	2.00
Cinq douz. de bouteilles à quarante sols la douz., fait..	10.00
Deux quarts vendus à..	2.00

Dans la cour:

Un escabeau..	1.00
Une pioche, un rateau et un trépied le tout..	4.10
Une brouette..	1.00
Une meule et sa manivelle..	3.00
Une cage à poule..	1.00

Montant total des meubles.. cy 4698.05

Dettes actives.

Livre A

Folio 11	Par Madame Cazeau..	cy	17.16
" 12	Par Mr. Fortier..		916.15
" 14	Par Philippe Loubet..		100.02
" 20	Par Mr. Philippe Loubet..		3.00
" 23	Par Me. Edw. Guille Gray, à régler..	mémoire	
" 23	Par M. J. A. Gray, à régler..	mémoire	
" 38	Par Mr. La Broquerie..		122.06
" 104	Par l'Honorable de Longueuil, à régler..	mémoire	

Livre B.

No. 39	Mr. Wm. Powell..	cy	64.00
" 52	Mr. Mézière..		6.17
" 62	Mr. Langan..		18.00
" 64	Cap. Archibald McDonell..		36.00

Livre B

No.	66	Mr. Teeple..	12.00
"	75	Mr. Morlière..	36.00
"	80	Mr. Gabrion, à régler..	mémoire
"	90	Mr. Montigny..	2.08
"	118	Mr. Anctil, avocat..	22.02
"	21	Mr. Le Brun..	1.16
"	117	Madame Veuve Fraser..	23.05
"	110	Jacques Roux..	20.00
"	130	Mr. Pascal de..	9.00

Livre C Petits comptes dont partie sont dus et le reste à régler.. mémoire

Lettre D Jean Reid, Ecuyer, par son compte folio I.. . . . cy 471.06

Livre E Mr. Thomas Forsyth, une année de Gazette.. . . . 18.00

Folio	1		
"	2	Mr. François La Pierre.. cy	16.00
"	2	L'Honorable Decorne..	72.00
"	3	Mr. Jordan..	18.00
"	3	Colonel Campbell..	18.00
"	4	Mr. John Turner..	18.00
"	5	L'Honorable Jean Fraser..	9.00
"	5	L'Honorable James Walker..	18.00
"	5	Docteur Symes..	18.00
"	6	Docteur Jobert..	18.00
"	6	L'Honorable James McGill..	18.00
"	7	L'Honorable Joseph Papineau..	18.00
"	7	Docteur Jones..	18.00
"	8	Mr. La Marre Porlier..	171.00
			mémoire
"	8	Jean Bte. Durocher, Ecuyer.. cy	18.00
			mémoire
"	9	Mr. Foretier.. cy	171.00
			mémoire
"	9	Mr. Alexandre Henry.. cy	18.00
"	10	Thomas Taylor..	54.00
"	10	J. H. Perrault..	90.00
"	11	Mr. Jean delisle, père..	18.00
"	11	Mr. Mézières..	27.17
"	12	Mr. Maurice Blondeau..	18.17
"	12	Mr. J. A. Gray..	144.00
			mémoire
"	13	Mr. Teeple.. cy	48.00
"	13	Mr. Ducharme, prêtre..	18.00
"	14	Général Christie..	40.10
"	14	Finlay Fisher..	66.00
"	15	Mr. Winter..	8.00
"	15	Mr. John McGill..	13.10
"	16	Mr. John Platt..	17.02
"	17	Mr. Shefflin..	13.10
"	17	Mr. Jacques Cartier..	18.00

Folio	18	Mr. Etienne Duignon..	25.10
"	19	Mr. Foucher, fils..	4.10
"	19	Mr. Mailloux, ptre..	\$1.10
"	20	Mr. Lukin, notaire..	18.00
"	20	Mr. Gibb, tailleur..	18.15
"	21	J. G. Délinel, fils..	90.00
		mémoire à régler.	
"	22	Mr. Hoyle.. cy	18.15
"	22	Mr. Desrivières Beaubien..	18.15
"	23	Mr. Le Houlier..	13.10
"	23	Me. De Lotbinière..	40.10
"	24	Messrs. de Lottinière et Symes..	13.10
"	24	Mr. Ancil, avocat..	13.10
"	25	Mr. Dillon..	13.10
"	25	Mr. Duchouquet..	18.00
"	26	Mr. Trudeau, tailleur..	31.00
		mémoire	
"	26	Mr. Standfield..	3.00
"	27	Mr. Joseph Nolin..	3.00
"	27	Mr. Rascony..	2.05
"	28	Jean Donagany, à régler..	mémoire
"	28	Me. Russell, avocat.. cy	14.05
"	29	Melle LaValterie, à régler..	mémoire
"	29	Mr. La Promenade.. cy	13.10
"	30	Duncan Fisher..	12.15
"	30	Mr. Joseph Perrault, charpentier..	6.00
"	31	Mr. Thomas Sullivan..	2.05
"	31	M. Barthelotte Dartigny..	18.00
"	32	L'Honorable Ant. Panet..	18.00
"	33	Madame Des Fonds..	18.00
"	33	Thomas Walker, Ecuyer..	14.00
"	34	Mr. Hébert..	10.10
"	34	Mr. Ferguson..	16.10
"	35	Mr. Racicot..	7.10
"	35	Mr. Dumaine..	19.10
"	36	Mr. L. Olivier..	19.10
"	36	Mr. Filion..	10.10
"	37	Mr. Taschereau..	19.10
"	37	Mr. Alex Dumas..	18.00
"	38	Mr. Corbin..	6.10
"	38	Mr. J. B. Hervieux..	15.00
"	28	Mr. Dubaron..	15.00
"	39	Mr. Jacques Roux, à régler..	mémoire
"	40	Mr. Duchesneau..	19.10
"	40	Mr. Ferrière..	2.05
"	41	Mr. Ferrière..	16.10
"	41	Mr. Frank..	13.10
"	42	Mr. Labadie..	38.05
"	42	Mr. Bonavy Panet..	81.00
"	43	Frederick Singer..	81.00

Folio	44	Monseigneur de Singer..	162.00
"	44	Mr. A. Gopellier..	19.10
"	44	Sr. A. Gosselin..	19.10
"	45	Mr. McFarlane..	19.10
"	45	Mr. Liebert..	19.10
"	46	Mr. Sketchley..	1.10
Livre F.	Par Mr. Labadie..	133.08	
Feuilles volantes:			
No.	AA	Par M. Durocher.. cy	3.14
			mémoire
"	BB	Par Mr. Lambert.. cy	8.18
"	CC	Par Mr. John Robb..	6.00
"	DD	Par Mr. Fisher..	54.00
"	EE	Mr. Brown, compte à régler..	mémoire
"	FF	Par Mr. Oldham.. cy	4.08
"	GG	Par Mr. J. A. Gray, à régler..	mémoire
"	HH	Par M. Perrault.. cy	82.12
"	II	Par Mr. Delisle, compte à régler..	mémoire
"	KK	Par Mr. Anctil.. cy	49.08
"	LL	Par Mr. Foretier..	144.04
"	MM	Par Mr. Ducalvet..	648.00
"	NN	Un bon de Bernier et Jones pour..	52.08
"	OO	Un billet de Mr. Ignace Bourassa pour la somme de.	133.00
		Cinq bons de dix-sept shellings de Mr. Foretier	
		faisant..	20.08
		Par jugement et exécution paraphé Q. G. D. contre	
		Jean Bte. Larchevesque..	21.08
		Par jugement paraphé Q. G. D. contre Jean Bte.	
		Molière, et les intérêts à ajouter..	39.16

20 février 1794.

Un paquet contenant environ quatre cent soixante-quinze piastres argent, papier des Etats-Unis, de nulle valeur, pour..

			mémoire
"	PP	Par Samuel David, compte à régler..	mémoire
"	QQ	Par feu George Smyth.. cy	21.00
"	RR	Par Mr. M..	8.00
"	SS	Par Mr. Liebert..	40.08
"	TT	Par Mr. Montigny..	32.08
"	VV	Par M. Nash, compte à régler..	mémoire
"	UU	Par Benjamin Barry, 3 mois de Gazette..	6.00
"	XX	Par..	14.12
"	YY	Par Mr. Philipps..	77.16
"	ZZ	Par Mr. Young Geolier..	122.00
"	&&	Par Jean Bte Neveu..	40.08
"	&va	Par M. Alex Serres..	14.08
Porte-feuille AB.	Sept comptes et billets dues par divers..		130.17

Montant des dettes actives.. 6087.13

Dettes passives.

Aux héritiers Chenier et Aubuchon pour deux quartiers de loyer de la maison, échus le premier de mai prochain à cinquante livres par chaque trois mois, fait.. . . .	cy	300.00
Pour frais funéraires, de feu M. Mesplet.. . . .		53.00
A Samuel, pour la cire.. . . .		23.12
A Mr. Lardy, pour cinq pains.. . . .		3.00
Au Docteur Bender.. . . .		12.00
A La Coste, perruquier.. . . .		12.00
A Mr. Sheffler, suivant son compte.. . . .		58.00
A Mr. Jos. M. Perrault.. . . .		32.05
A Edouard Guillaume Gray pour livres qu'il avait donné à vendre au sieur Mesplet suivant son compte se montant à vingt-cinq livres quatre shellings et six pence sterling. sur quoi il y aura à déduire les livres qui restent invendus ainsi qu'il est porté au présent inventaire pour mémoire, compte à régler.. . . .	mémoire	
Au dit sieur Gray, l'ancienne imprimerie avec ses caractères, et autres ustensils en dépendant, appartenant le tout au dit sieur Gray, comme l'ayant acheté par encan public, ne l'ayant passé au sieur Mesplet que pour s'en servir.. . . .	mémoire	
A bon a Gibb, tailleur, suivant son compte affirmé.. . . .	cy	96.00
A John Fisher, marchand, suivant son compte.. . . .		196.11
A Mr. La Mare porlier, suivant son compte affirmé.. . . .		552.00
A François Trudeau, suivant son compte affirmé.. . . .		90.00
A M. Jacques Le Moine, de Québec, suivant sa lettre en date du dix février, courant la somme de.. . . .		552.00
A Mr. Berger, suivant obligation la somme de sept mille deux cents livres, sans y comprendre les intérêts qui doivent y être ajoutés.. . . .		7200.00
A M. Marassé, suivant son compte, la somme de.. . . .		1764.12
A Jean Bte. Durocher, Ecuyer, suivant son obligation.. . . .		3145.11
A Mr. Jonathan Abraham Gray, suivant son billet du 18 août 1785, jusqu'au 18 janvier 1794, avec intérêts.. . . .		1347.04
A Mr. Emond, de Québec, pour balance de compte.. . . .		158.14
A Philippe Loubet, suivant billet, la somme de.. . . .		3428.00
A Mr. de Longueuil pour loyer.. . . .		500.00
A Mr. Lusignan, suivant obligation la somme de.. . . .		1160.00
A Madame Mesplet veuve, pour son deuil, la somme de.. . . .		193.10
A Charles Rascony.. . . .		24.00
A J. G. Delisle, suivant son compte.. . . .		337.15
A J. G. Delisle pour traduction.. . . .		60.00
Montant des dettes passives commues.. . . .		21279.14
Il faut observer que par le contrat de mariage de feu sieur Mesplet et la dite De Marie-Anne Tison, sa veuve, il est fait mention qu'il appartiendrait à la dite veuve Mesplet qu'elle avait apporté à son dit mariage et qu'elle s'est réservé nature de propre la somme de trois mille vingt-deux livres dix sols ou shellings de vingt coppres, pour laquelle somme et au-dela elle avait consenti deux obligations, dont une à M. Charles Lusignan et l'autre à Jean Bte. Durocher, Ecuyer.. . . .	mémoire	

Titres et papiers.

Contrat de mariage entre Mr. Fleury Mesplet et Dlle. Marie Anne Tison, en date du 11 avril 1790, aux clauses et conditions y contenues, No. et cotté.. . . .	Un
Une liasse de papiers intitulé Comptes et Billets, inventoriés et cottés.. . . .	Deux
Une liasse de papiers intitulé Papiers Inutiles, etc., mauvaises dettes, inventorie, cotté.. . . .	Trois
Une liasse de papiers intitulé Papiers de Robineau	Quatre
Une liasse de papiers intitulé Dettes passives	Cinq
Une liasse de papiers intitulé Quittance.. . . .	Six
Une liasse de papiers intitulé Petits Livres et Bons	Sept
Une liasse de papiers intitulé Lettres.. . . .	Huit
Un paquet couvert de papier bleu contenant l'argent papier des Etats-Unis.. . . .	Neuf
Un porte-feuille marqué en dedans A. B., contenant des quittances et comptes dus.. . . .	Dix
Un répertoire marqué depuis la lettre A jusqu'à celle Z.. . . .	Onze
Un livre de souscription à Bonne Justice, contenant huit pages	Douze
Un livre de compte contenant vingt-quatre pages.. . . .	Treize
Livre E Un livre de compte contenant quatre-vingt-quatorze pages.. . . .	Quatorze
" D Un livre sur lequel il n'y a que trois pages d'entrées et qui ne contient que le compte de Mr. Reid.	Quinze
" C Un livre de compte, contenant dix pages écrites seulement le reste blanc.. . . .	Seize
" A Un livre de compte, contenant cinquante-quatre pages et demie dont une page et demie à la fin et le reste blanc.. . . .	Dix-Sept
" B Un livre de compte, contenant cent quatre-vingt-treize colonnes.. . . .	Dix-Huit
" F Un petit livre contenant seulement quatre pages d'écrites.. . . .	Dix-Neuf

Ce fait après avoir vaqué depuis la dite heure jusqu'à cinq heures du soir et qu'il ne s'est plus rien trouvé à inventorier a été cessé, et tout le contenu au présent inventaire est demeuré en la garde et possession de la dite dame Marie-Anne Tison, veuve Mesplet, qui a promis le tout montrer et exhiber toutes fois et quand elle en sera requise promettant qu'au cas qu'elle découvrirait quelque chose qui aurait pu être omis au présent inventaire de le déclarer aux fins d'être ajouté à la suite des présentes.

Et ont signé avec nous Nores à Montréal, le vingt février mil sept cent quatre-vingt-quatorze, et ont signé,

(Signé) TISON MESPLET,
LUSIGNAN,
LOUIS HARDY,
LS. CHABOILLEZ, N. P.,
JEAN GUILLE. DELISLE, N. P.

No. 74.

Renunciation of community of goods by Madam Mesplet with her late husband.

Aujourd'hui est comparue par devant les notaires de la province du Bas-Canada, résidant à Montréal, soussignés, Dame Marie-Anne Tison, veuve de sieur Fleury Mesplet, imprimeur, décédé le vingt-huitième jour de janvier dernier, la dite comparante demeurant en sa maison sise en cette ville, rue Notre-Dame; laquelle a par les présentes renoncé à la communauté de biens qui a été entre elle et le dit défunt, son époux, pour lui être plus onéreuse que profitable, jurant et affirmant en son âme et conscience devant les dits notaires n'en avoir pris ni appréhendé aucun bien et ne s'y être immiscée en façon quelconque; sous toutes fine que la présente renonciation puisse nuire ni préjudicier aux droits, noms, raisons et actions de la dite comparante; s'en tenant aussi à son douaire, préciput, reprises et autres conventions à elle accordés par son contrat de mariage. Dont et de ce que dessus elle a requis acte aux dits notaires, pour lui servir et valoir ce que de raison; et pour faire inscrire et signifier les présentes à qui il appartiendra, la dite comparante a fait et constitué son procureur, le porteur des présentes, lui donnant pouvoir de ce faire.

Fait et passé au dit Montréal en l'étude de Jean Guillaume Delisle, l'un des notaires soussignés, l'an mil sept cent quatre-vingt-quatorze, le vingt février après-midi; et à la dite comparante signé avec nous notaires, lecture faite,

(Signé) MARIE-ANNE TISON,
VEUVE MESPLET,
J. P. GAUTHIER, Ecr., Ntre.,
LOUIS THIBAUDEAULT,
JEAN GUILL. DELISLE.

No. 75.

Sale of stock and furniture of the estate of the late Fleury Mesplet.

24 to 27 February, 1794.

L'an mil sept cent quatre-vingt-quatorze, le vingt-quatrième jour de février, à neuf heures du matin, à la requisition de sieur Louis Hardy, demeurant en sa maison sise en cette ville, rue Notre-Dame, curateur élu par l'assemblée des amis de feu Fleury Mesplet, de son vivant imprimeur à Montréal, à la succession vacante du dit sieur Mesplet homologué par les honorables juges de la cour des plaidoyers communs pour le district de Montréal, ainsi qu'il appert par le certificat de Me. Reid, greffier de la dite cour, en date de vendredi dernier vingt-unième jour du présent mois de février, il va être par les notaires à Montréal, soussignés procédé à la vente publique des mobiliers dépendants de la dite succession, compris en l'inventaire qui en a été fait par les dits notaires, commencée le dix-septième jour du présent mois de février et continuée par ajournement ainsi qu'il appert au dit inventaire, trouvé en la maison du dit Fleury Mesplet, imprimeur, sise en cette ville, rue Notre-Dame. La dite vente préalablement annoncée hier à la porte de l'Eglise paroissiale de cette ville à l'issue du service divin par Jacob Kuhn et annoncé ce jourd'hui par le même au son de la cloche

aux principales rues de la ville et faubourg de Montréal. Les dits meubles exposés en vente publique par le dit Jacob Kuhn, juré crieur, qui après avoir reçu en chère et sur enchère, les a adjugés aux plus offrant et dernier enchérisseur pour les sommes et aux personnes mentionnées aux marges de la présente vente, ainsi suit l'entrée,

M. Tison, un tournebroche, une broche, un poids de quatorze et un poids de sept livres... .. cy	12.00
Barth Billion, une crémayère.. ..	3 15
Pierre Papier, une paire de chenets.. ..	3.00
N. Bellerive, une marmite.. ..	3.00
Jacques Aveline, une marmite.. ..	5.15
Barth Billion, une marmite.. ..	3.00
N. Adhemar, une pelle et une pince.. ..	5.10
Jacques Aveline, une poêle à frire.. ..	3.15
N. Lusignan, une poêle à frire.. ..	3.15
N. Lardy, une poêle à frire.. ..	1.15
Louis Hardy, une tourtière de cuivre.. ..	12.05
Pierre Beaujeu, une tourtière de feu.. ..	2.00
N. Chaboillez, Nore., trois petits trépieds.. ..	2.15
M. Bellerive, un grit.. ..	1.04
Pierre Papin, un grit.. ..	1.00
Md. Foucher, la jeune, une casserole de cuivre avec son cou- vert à.. ..	5.05
Tison, père, trois fers à flasquer.. ..	5.05
Jean Bte. Levesque, une coquette.. ..	.18
Lusignan, une soupière de fer blanc.. ..	2.10
Luc Berthelet, un plat et un arrosoir de fer blanc.. ..	2.00
Billion, un moulin à poivre.. ..	7.05
Rascony, une passoire de cuivre	1.15
Dufour, un poëlon de cuivre.. ..	4.00
F. Vinelier, un canard de cuivre.. ..	4.15
Tison, une broche, quinze sols.. ..	.15
John Gom, deux sceaux ferrés.. ..	2.15
Jacques Aveline, deux sceaux ferrés	4.00
Billion, un couteau à hacher et une saucepanne.. ..	4.00
William Clarke, six plats.. ..	3.15
François Tison, trois chandeliers de cuivre.. ..	7.15
Rascony, un martinet et deux portes-mouchettes.. ..	2.05
Papin, une fontaine sans bassin et la monture.. ..	5.00
Jean Reeve, un pilon de fer.. ..	5.00
Billion, une Egohine.. ..	5.05
Tison, père, deux Egohines.. ..	5.10
Mde Foucher, la veuve, une cuillère à pôt et un écumoir.. ..	2.00
I. Pelletier, une paire de balance de fer blanc.. ..	5.00
John Feschen, deux boîtes de fer blanc.. ..	3.00
Pierre Fournier, un moulin à café.. ..	3.10
Finlay, deux boîtes avec de la feraille.. ..	6.10
Jean Chonapen, une boîte avec de la feraille.. ..	1.12
Luc Berthelet, un soufflet.. ..	2.05
John Zorn, une rape et cacheaux de fer blanc, le tout.. ..	1.04
Billion, deux targettes, banc de fer.. ..	2.05

Lusignan, une barre de fer..	2.10
Finlay, un fusil..	18.00
Jos. Donegany, un lot de vaisselle de fer blanc..	2.01
Hardy, une canne de jonc..	5.00
John Gunlack, deux pôts de grès..	5.15
Jean Chouafrer, quatre petits pôts de grès	4.10
Luc Berthelet, deux cruches de grès..	7.00
John Gunlack, deux cruches de grès..	4.05
Thomas Thiefplin, deux cruches de grès..	1.15
W. Clarke, une théière, six tasses et soucoupes et le sucrier, ensemble..	5.15
G. Delisle, un cabaret..	2.00
Rascony, six tasses et soucoupes à café..	3.00
M. Idge, une chaudière de cuivre et son trépied à..	15.00
Thomas Thiefplin, une chaudière de cuivre..	8.00
Mde Foucher, la jeune, trois jalousies, neuf livres..	9.10
Joseph Donegany, quatre petits cadres..	2.05
Billion, deux petits cadres..	1.15
Ths. Thiefplin, quatre petits cadres, trois livres..	3.04
Pierre Fuette, un Christ..	6.00
John Gray, trois Christ..	19.00
Bunarvy, une image et un cadre..	1.19
Bunarvy, cinq images encadrées..	3.10
Jos. Donegany, un dessus de porte-peintre..	1.16
Billion, deux tableaux du Roy et de la Reine..	4.15
Pierre Papin, deux tableaux sur plâtre du Roy et de la Reine de France..	2.09
J. G. Delisle, un petit arrosoir de jardin..	1.19
Veuve Mesplet, un grand arrosoir de jardin..	2.12
Billion, une gratte et un râteau..	2.12
Jean Delisle, une hache..	3.00
Lambert, une meule avec sa manivelle de fer..	6.00
Billion, un thermomètre..	2.10
Madame Foucher, la veuve, un baromètre, sept livres..	7.15
Godefroy Galow, un trébuchet à..	9.00
Belair, un mouchon de loup..	8.00
Donagany, un casque de marte avec sa boîte..	24.05
Billion, un chapeau..	5.10
Billion, un étui avec deux rasoirs et la pierre..	3.15
Lusignan, une robe de chambre..	12.05
W. Edger, une robe de couverte..	8.00
Lusignan, une redingotte de drap..	55.00
Jean Chonsper, un habit de drap..	36.00
Lusignan, une culotte de drap..	12.00
Samuel Rousse, un habit noir..	15.10
Samuel Rousse, une culotte noire..	7.15
Chs. Chapins, une culotte de serge noire..	8.15
Chausper, une veste drap noir..	6.00
Chausper, une culotte drap noir..	2.00
Nic. Clark, une veste casimir vert brodé..	23.00
Pierre Lemieux, une veste de taffetas..	3.10

Pierre Lemieux, une veste soie et coton	4.00
Luc Barthelet, une veste satin brodée.. . . .	7.00
Sam Street, une robe d'indienne avec la veste.. . . .	3.00
Pierre Lemieux, trois gilets de flanelle.. . . .	4.10
Bellair, sept paires de bas de soie.. . . .	4.10
Chs. Chapins, deux balles.. . . .	1.15
Pierre Lemieux, trois chemises.. . . .	10.10
Bellain, trois chemises.. . . .	4.05
Gunn, trois chemises.. . . .	4.19
John Gunlach, deux chemises.. . . .	4.15
Q. Donegany, deux caleçons.. . . .	1.10
W. Clark, deux bonnets de coton.. . . .	2.01
Banet Mettan, deux nappes.. . . .	11.00
Chapins, deux nappes.. . . .	10.00
Wm. Clarke, deux nappes.. . . .	10.10
I. M. Levesque, deux nappes.. . . .	10.00
Ch. Smallwood, une paire de draps.. . . .	3.15
A. Jobert, une paire de draps	4.00
Ch. Smallwood, un drap.. . . .	3.00
Curot, fils, une table de pain.. . . .	.15
I. Donegany, trois serviettes.. . . .	1.16
I. Donegany, un vieux linge.. . . .	.10
Sam Clark, trois pôts de terre, ensemble.. . . .	2.01
John Colcoph, douze assiettes de faïence, le tout.. . . .	2.15
Jm. Papin, une douzaine Dre. Pre.. . . .	2.06
Luc Berthelet, une douz. et demie Dre. Pre., le tout.. . . .	5.00
Papin, quinze assiettes do., le tout.. . . .	3.12
Lambert, deux bassins, ensemble.. . . .	4.00
Luc Berthelet, deux plats ronds, ensemble.. . . .	2.00
John Gunlach, six bolles, ensembles quarante-cinq sols.. . . .	2.05
Luc Berthelet, deux petits plats, ensemble.. . . .	1.04
Jos. Flemau, un saladier et un boll, ensemble.. . . .	.17
Flemau, un lot de tasses et soucoupes.. . . .	.16
Luc Berthelet, deux sauciers, ensemble.. . . .	1.00
J. Flemau, six couteaux et fourchettes.. . . .	10.06
Gordon, six couteaux manches argentés, ensemble.. . . .	4.15
Biron, une montre d'argent avec la boîte.. . . .	60.00
Jh. Flemau, deux saladiers, ensemble.. . . .	2.09
Fr. Frink, deux cadres, ensemble.. . . .	9.00
Frink, quatre cadres à huit livres pièce, fait.. . . .	32.00
J. G. Delisle, un cadre.. . . .	4.05
Luc Barthelet, un cadre.. . . .	4.00
Flemau, trois cadres.. . . .	7.19
Gordon, un cadre avec le calendrier.. . . .	2.00
Delisle, dix images à.. . . .	12.10
J. G. Delisle, deux images, ensemble.. . . .	4.00
Delisle, six images, ensemble.. . . .	10.10
Flemau, treize calendriers, ensemble.. . . .	2.05
Billon, six crochets à chapeau, ensemble.. . . .	2.10
Brindamour, une grande image.. . . .	.15

Flemau, un miroir plus grand.. . . .	12.05
Tison, un miroir plus grand.. . . .	40.00
G. Ring, un guéridon.. . . .	96.00
Delisle, une table de noyer noir.. . . .	57.00
Delisle, une petite table de mohagany.. . . .	13.05
W. Nadford, une petite statue equestre.. . . .	5.00
Flemau, une pendule.. . . .	85.10
Bamer M., un piédestal de plâtre.. . . .	1.14
Baumer M., une paire de rideaux avec la tarjette, le tout.. . .	20.00
Tous. Pelletier, un pôt de faïence.. . . .	.13
J. Donegany, deux boîtes de fer blanc, ensemble.. . . .	2.00
Luc Berthelet, une théière et un pôt au lait, ensemble.. . . .	.10
Jos. Donegany, une douz. fioles à moutarde, le tout.. . . .	.13
Jean Chasdin, quatre petits flacons, ensemble.. . . .	2.02
Th. Donegany, un pôt de terre et un flacon, ensemble huit sols.	.08
J. M. Huppé, une caisse avec neuf flacons, le tout.. . . .	6.15
Pre. Fiset, une paire caraffes à eau.. . . .	3.10
J. Donegany, trois gobelets de cristal, ensemble.. . . .	1.07
Tison, père, six gobelets de cristal, pour quarante.. . . .	2.09
Donegany, quatre vers à patte, ensemble.. . . .	2.08
L. Hardy, cinq vers à patte, ensemble.. . . .	2.01
Bellerive, un pôt et deux flacons, ensemble.. . . .	.18
Pre. Fiset, trois caraffes, ensemble.. . . .	7.15
Luc Berthelet, une cage à oiseau.. . . .	3.15
Donegany, une cage à oiseau.. . . .	2.00
Tison, père, une rame de papier imprimée en A. B. C.. . . .	10.00
Fr. Sarro, une rame de papier.. . . .	11.05
Tison, père, un lot d'A. B. C. Latin.. . . .	3.05
J. B. Choidrer Donegany, quatre paquets de petits thèmes im- primés imparfait, le tout.. . . .	.16
Donegany, seize brochures de prières sauvage, le tout pour.	.10
Sarro, trois paquets de brochures intitulées La Dévotion aux Sts-Anges, le tout.. . . .	2.10
Mr. Saurrien, un paquet de psautiers, le tout pour.. . . .	24.00
Saumers, un paquet de psautiers pour.. . . .	31.00
Saumers, deux cent soixante-dix-sept brochures de la dévotion à la Ste-Famille, le tout.. . . .	6.00
Donagany, un lot de livres d'écoles anglais, imprimés, le tout.	16.00
L. Saulniers, soixante-cinq petits alphabets, le tout pour..	7.00
I. B. Castonguay, La Bastille Septentrionale, 145 exemplaires, le tout pour.. . . .	4.00
Chs. Félix, règles pour convertir le cours d'argent et des pro- vinces d'Amérique, 308 exemplaires pour.. . . .	3.10
Tison, père, Constitution Française, 23 exemplaires, le tout.	2.00
D. David, un livre de prières (Anglais).. . . .	3.02
Farkell, six Innoculation du Bon Sens, le tout pour.. . . .	1.00
F. Savantes, Dialogues Curieux, 21 ex., le tout pour.. . . .	2.17
Chs. Adam, Tragédie de Jonathas, 12 exemplaires, le tout..	.15
L. Lavoules, trente-six abrégés de la versification française, le tout pour.. . . .	2.00
P. Pepin, un livre de théologie pour chronologie, pour seize..	

F. Sarault, histoires chantantes de Mr. Lavalinière.. . . .	1.12
Bte. Proulx, vingt-neuf constitutions françaises, le tout pour.	1.17
F. Sarault, neuf séries ex. manuel, le tout pour.. . . .	6.00
F. Savant, instruction pour la confirmation, le tout pour.. .	7.12
Ch. Smallwood, vingt-un livres blancs.. . . .	5.00
F. Sarault, un paquet de cantiques.. . . .	5.19
Jos. Farkell, discipline militaire pour.. . . .	.19
Dubois, messes de Ste-Famille pour.. . . .	1.02
Guoin, un paquet de Tableau de Rues de Montréal.. . . .	1.08
Beaujeu, un paquet de lettres circulaires.. . . .	.10
Chafroy, engagement pour le pays d'en haut.. . . .	3.00
Delisle, père, un paquet de Sandrac.. . . .	4.00
Lusignan, deux gravures en cuivre.. . . .	5.10
Tison, père, trente-sept paquets de jeux de dame, le tout à..	2.10
Jean Bouthillier, trois paquets d'exemples à.. . . .	1.10
Hardy, deux paquets d'exemples à.. . . .	1.00
G. Reid Greffier, vingt paquets de papiers à écrire.. . . .	19.00
Ths. Letams, Le Bill de Québec.. . . .	.05
Chs. Lusignan, vingt-cinq mains papier à écrire.. . . .	13.00
Chs. Lusignan, 10 mains papier à écrire.. . . .	6.00
Fentayson, six mains papiers.. . . .	5.00
Mr. Delisle, père, dix-huit mains papiers.. . . .	19.00
J. Bouthillier, douze mains papier bleu.. . . .	7.10
I. Boutheiller, douze mains papiers bleu.. . . .	8.00
I. Boutheiller, onze mains papier bleu.. . . .	7.05
J. G. Delisle, un lot de papier.. . . .	3.06
Gauthier, douze mains papiers à écrire.. . . .	10.05
Th. Walker, douze mains papier rouge.. . . .	12.00
J. B. Boutheillier, douze mains papiers rouge.. . . .	9.05
J. G. Delisle, six mains papiers rouge.. . . .	4.07
A. Desery, six demi mains papier royal.. . . .	5.10
F. Freingue, deux mains papiers royalle.. . . .	2.11
E. Lusignan, quinze demi mains papier royal.. . . .	41.00
J. G. Delisle, une rame papier à lettres doré sur tranches.. .	15.00
F. Treingue, cinq demi mains papier à lettre, uni.. . . .	3.03
Chs. Lusignan, dix mains papiers marbré.. . . .	9.00
Lusignan, huit mains papiers marbré (petit).. . . .	6.00
J. Reid, une boîte d'oublies.. . . .	6.00
J. Boutheillier, trois boîtes d'oublies.. . . .	3.00
Crossby, trois boîtes d'oublies.. . . .	3.18
Alex. McLeod, trois boîtes d'oublies.. . . .	3.10
Tison, père, trois boîtes d'oublies.. . . .	3.10
I. G. Delisle, trois boîtes d'oublies.. . . .	3.10
Crossby, trois boîtes d'oublies.. . . .	3.09
James Finlay, trois boîtes d'oublies.. . . .	3.09
J. Reid, un cent plumes à écrire.. . . .	5.10
Tison, père, un cent plumes à écrire.. . . .	5.10
J. Reid, un cent plumes à écrire.. . . .	3.10
J. Reid, un cent plumes.. . . .	6.00
J. G. Delisle, un cent plumes.. . . .	5.10
P. Fortier, un cent plumes.. . . .	5.10
Isidore Lacroix, un cent plumes.. . . .	4.10

J. Reid, un cent plumes..	4.10
Delisle, père, un cent plumes..	5.10
P. Fortier, une cent plumes..	5.10
J. Reid, un cent plumes..	6.00
Tison, père, un cent plumes..	6.00
A. et McLeod, un cent plumes..	4.00
Labissanière, cinq paquets plumes..	5.05
Garfriend Glasgow, dix crayons noirs..	2.11
Bellaire, douze crayons noirs..	4.05
Tison, père, deux douz. crayons noirs..	8.10
Tison, fils, huit crayons..	3.00
P. Fortier, six crayons..	2.03
Tison, père, trois paquets d'encre rouge..	2.08
J. Reid, quatre douz. d'encre noire..	3.00
P. Fortier, une fiole d'encre rouge préparée.. . . . .	.15
P. Papin, une fiole d'encre préparée.. . . . .	.15
Delisle, père, une fiole d'encre rouge.. . . . .	.15
Une fiole d'encre rouge.. . . . .	.19
Wm. Edge, deux sabliers..	1.00
P. Papin, deux sabliers..	1.00
J. Fortier, deux sabliers..	1.00
Frs Lanouette, fils, trois sabliers..	1.04
E. Edwards, six paquets de grandes cartes blanches, un écu.	3.00
Lemoine, cinq paquets de grandes cartes blanches..	6.00
Th. Donegany, deux règles rondes..	2.07
J. Papineau, une règle ronde..	1.14
M. Delisle, père, deux règles rondes..	1.04
David David, deux règles rondes..	1.15
John Bell, une règle ronde..	1.16
E. Fortier, deux règles rondes..	1.04
I. D. Inkell, une règle ronde..	1.17
P. Dubois, une règle ronde..	1.03
E. Edward, cinq paquets cartes blanches..	2.10
David David, six paquets cartes blanches..	4.15
E. Edward, cinq paquets cartes blanches..	3.10
Tison, père, cinq cornets papiers cinquante bols..	2.10
Tison, père, six bonêts, cuir, six francs..	6.00
Tison, père, cinq bonets cuir, quatre livres quinze sols..	4.15
J. Donegany, un carnet quarré, cinquante sols..	2.10
J. Papin, un carnet rond, trente sols..	1.10
Tison, père, une livre de cire noire, huit livres cinq sols..	8.05
David David, une livre de cire noire, huit livres cinq sols..	8.05
I. Edward, une livre de cire noire sept livres dix sols..	7.10
Tison, père, une livre cire rouge, six francs..	6.00
E. Edward, une livre cire rouge, six francs..	6.00
Delisle, père, une livre cire rouge, six francs..	6.00
P. Fortier, une livre cire rouge, six francs..	6.00
E. Edward, une livre cire rouge, six francs..	6.00
Dr. Jobert, une livre cire rouge, six francs..	6.00
J. G. Delisle, une livre cire rouge, six francs..	6.00
E. Edward, un paquet cire rouge, cent cinq sols..	5.05
Delisle, père, un trébuchet, douze livres quinze sols..	12.15

Delisle, un trébuchet, dix livres dix sols..	10.00
Tison, père, un trébuchet..	14.10
Lafantaisie, un trébuchet..	14.10
Ls. Hardy, un trébuchet de petite tablette..	2.00
Delisle, père, une paire de petites tablettes..	2.00
Dezery, une paire de petite tablette..	2.00
Sanguinet, une paire de petite tablette..	2.00
Dubois, un couteau d'ivoire..	1.07
Jobert, un couteau d'ivoire..	1.07
Mesplet, un couteau d'ivoire..	1.13
Tison, un porte-feuille noir..	3.01
Gunn, un porte-feuille petit..	3.01
Dezery, un porte-feuille rouge..	3.19
Dubois, un porte-feuille rouge..	6.01
J. H. Donegany, une seringue	3.00
Fr. Sarro, trois paquets de Spelling Book, le tout..	3.00
Glasgow, un petit dictionnaire anglais	1.10
Haldimand, quatre vers à encre, ensemble.. . . . .	.08
Rasconi, quatre vers à encre, ensemble.. . . . .	.11
I. G. Delisle, six vers à encre, ensemble.. . . . .	.17
I. G. Delisle, un cornet d'étain avec trois vers, le tout..	4.10
Tison, père, un paquet d'A. B. C. français..	1.15
J. G. Delisle, six feuilles de parchemin	6.00
J. Pepin, deux brochures et une, le tout..	1.04
J. A. Degray, une boîte avec des oublies, le tout..	1.17
J. Delisle, cinq timbres, ensemble..	2.00
Powis, un équerre, un pied de Roy et un rapporteur, le tout..	4.00
Jan Finlay, un paquet de gazette..	1.11
D. Jobbert, une boîte desandorac..	1.04
David David, deux vol. Dictionnaire de Boyer..	5.15
L. Hardy, un cornet Sanderac..	1.10
David David, un chien de marble cassé..	1.00
David David, un lot de brochures..	1.10
John Finlayson, un lot de plomb et ferrailles..	1.10
Rascony, un lot de brochures..	1.10
Lafantaisie, deux flacons apâstre, ensemble..	3.00
De Gray, un lot de brochures.. . . . .	.15
J. Lafontaine, un berceau..	101.00
Jobbert, une table en pied de biche, dix-neuf sols..	8.19
Tison, un buffet..	16.00
Simon Clark, une grande volière..	5.00
C. Wagner, une table avec un buste, le tout..	3.00
Rascony, une chaise d'aisance..	1.05
Rindfle, une petite laiterie..	1.12
Rascony, une table..	4.07
Berthelet, une jarre dix livres..	10.05
Berthelet, un poêle de fer avec 8 feuilles de tuyau et le recoude, le tout..	96.00
Wagner, huit chaises peintes en bleu, le tout..	9.12
Luc Berthelot, 6 chaises tournées, ensemble..	24.00
J. L. Lafantaisie, 8 chaises tournées, ensemble..	

M. Edward, sept cent quatre-vingt-sept livres ou environ de caractère neuf d'imprimerie avec les cases, le tout.. ..	1620.00
Pre. Pepin, le bord d'un ciel de lit.. ..	1.00
Mr. Edward, un poêle Palmier.. ..	66.00
Fortier, une poêle à fourneau.. ..	73.10
Pre. Papin, un coffre.. ..	.13
Jos. Fortier, un bois de Beaudet.. ..	2.01
P. Pepin, un coffre.. ..	1.04
C. Wagner, une couchette.. ..	3.08
Tison, père, quatre vieux chassis vitrés.. ..	5.00
M. Edouard, une presse à rouler.. ..	12.00
Pre. Pepin, une valise.. ..	2.10
Luc Berthelet, une couchette.. ..	2.01
W. Edouard, une presse à relieure avec les outils nécessaires, le tout.. ..	51.00
Edward, une petite presse à papier pour.. ..	28.00
Tison, père, une armoire.. ..	20.00
Tison, père, plancher du magasin.. ..	16.00
Chs. Wagner, deux paillasses, un lit cottonier.. ..	15.00
M. Fortier, un lot bouteilles.. ..	9.00
C. Vendelac, trois-quarts vindes.. ..	3.03
C. Vendelac, un saloir.. ..	3.12
Jh. Canada, un coffre.. ..	4.10
W. Clarke, un lot charbons.. ..	4.15
I. Furkell, un tas futailles.. ..	4.15
C. Vendelac, un m atelas et un traversin.. ..	10.15
Roscaud, une robe de beuf.. ..	6.02
Roscaud, une robe de beuf.. ..	14.10
Witteman, un lit de plumes.. ..	17.00
W. Eare, Junior, deux oreillers et un traversin.. ..	6.00
Turkell, quatre couvertes.. ..	5.11
Allard, une cage à poule, un marche-pieds, une vieille brouette.. ..	1.16
H. Wittman, une table.. ..	6.10

Ce fait après avoir vaqué jusqu'à midi précis et qu'il ne s'est plus rien trouvé à vendre ayant exactement suivi l'inventaire a été copié et expédié, et ont signé,

JACOB KUKN.

No. 76.

Power of attorney from C. Louis Hardy, curator of estate Fleury Mesplet to Michel Dubord.

Par devant les notaires de la province de Québec, résidant à Montréal, soussignés,

Fut présent Me. Louis Hardy, demeurant en sa maison sise en cette ville, rue Notre-Dame, curateur en justice à la succession vacante de feu Fleury Mesplet de son vivant imprimeur à Montréal, lequel a fait et constitué pour son procureur général et spécial, le sieur Michel Dubord, un des convives de sa Majesté en cette dite province, demeurant ordinairement dans la ville de Québec auquel il donne pouvoir de pour lui et en son nompercevoir toutes les sommes de deniers qui peuvent être actuelle-

ment dues à la dite succession vacante par les différents suscripteurs à la ci-devant Gazette de Montréal, le long du fleuve St. Laurent en descendant et dans la ditte ville de Québec; de recevoir les dites sommes en donner bonnes et suffisantes quittances en son nom, et à défaut de paiement poursuivre juridiquement les débiteurs de la dite succession Mesplet obtenir jugement et les faire mettre en exécution et sur le tout plaider, opposer, appeler, élire domicile substituer un ou plusieurs procureurs, les révoquer et en constituer d'autres et généralement faire par le dit procureur constitué tout ce qu'il avisera toujours pour le plus grand avantage de la dite succession promettant le dit sieur constituant le ratifier toutes fois et quand il en sera requis obligeant, etc.; fait et passé au dit Montréal, en l'étude de Jean Guillaume Delisle, l'un des notaires sousignés, l'an mil sept cent quatre-vingt-quatorze, le dix-huitième jour de juin, après-midi et a le dit sieur constituant, signé avec nous notaires, lecture faite.

LOUIS HARDY,
LOUIS THIBAUDEAU,
JEAN GUILLAUME DELISLE.

G No. 77.

Extrait du testament de Jean Baptiste Tison, du date de 27 novembre 1794. "Donne et lègue à Marie-Anne Tison, sa fille, pareille somme de cent cinquante chelins de vingt coppres, payable deux ans après le décès du dit testateur.

No. 78.

Judgment in favour of J. Marie Desautels vs Charles Berger and Fleury Mesplette.

Expédié, Exn., 22 juillet 1785.

Dette £364 2s 3d. Frais £6 3s 2d = £370 5s 5d = \$1,581.10.

Entre Joseph Marie Desautels comparant par Me. Walker, avocat demandeur, d'une part, et Charles Berger et Fleury Mesplette, imprimeurs associés, comparants, savoir le dit Charles Berger par Me Mézière, avocat, et le dit Fleury Mesplette, en personne—Défendeurs, d'autre part. Après que Me. Walker pour le demandeur a conclu que sa déclaration tendant à fixer la condamnation contre les défendeurs au paiement de la somme de trois cent soixante et quatre livres deux chelins et trois deniers du cours actuel, due au demandeur pour argent prêté et par compte, avec intérêts et dépens. Le dit Fleury Mesplette, un des défendeurs, a dit qu'il reconnaît la dette et confesse jugement tant pour lui que pour le dit Charles Berger, son associé. Me Mézière, avocat du dit Charles Berger a dit qu'il supplie la Cour lui permettre de fournir sa défense jeudi prochain aux fins de prouver qu'une exécution ne peut sortir contre lui attendu qu'il n'est point associé en cette dette avec le dit Fleury Mesplette.—Parties ouïes, la Cour donne acte au demandeur de la confession du dit Mesplette et admet le dit Berger à prouver jeudi prochain qu'il n'est point l'associé de Fleury Mesplette dans le cas présent.—Le tout considéré. La Cour condamne les dits défendeurs à payer au dit demandeur la somme de trois cent soixante et quatre livres deux chelins et trois deniers, contenue en la déclaration du demandeur, aux intérêts de la dite somme à compter de ce jour jusqu'à actuel paiement, et aux dépens taxés à six livres trois chelins et deux

deniers,—sauf cependant au dit Berger comparant par Me Mezière à faire voir à huitaine qu'exécution ne peut sortir contre lui n'étant point associé en cette affaire.—Mandans, etc.

No. 79.

From la Gazette Littéraire pour la ville et district de Montréal, 2 juin 1779.

TANT PIS TANT MIEUX.

Le papier Périodique est sur le point d'être interrompu, **tant pis**. Plusieurs disent au contraire, qu'étant aplaudi généralement il sera continué, **tant mieux**.

On emploie tout pour l'anéantir l'imprimeur et la presse, pour priver par ce moyen le public de s'éclairer et de s'instruire, **tant pis**. Les personnes de bon sens disent à cela, le bon droit de l'imprimeur, l'utilité de la presse et l'équité d'un Gouvernement éclairé, empêcheront l'effet, **tant mieux**.

On se plaint qu'il règne trop de liberté dans les écrits, et que les auteurs ne ménagent personne, **tant pis**. Mais aussi dit-on que cette naïveté est absolument nécessaire et qu'il est à propos de chatier les moeurs en riant, **tant mieux**.

Dans l'imprimerie on met les hommes à la presse, on les y écorche tous vifs, **tant pis**. Mais c'est pour les rendre meilleurs, **tant mieux**.

Le spectateur tranquille est haï, et tous les ouvrages dans lesquels il critique trop ouvertement lui font bien des ennemis, **tant pis**. Mais tous les honnêtes gens que la bonne conduite met à couvert de ses coups l'estiment tout plein, **tant mieux**.

La dernière Production de l'Ingénu a fait murmurer contre l'auteur et l'imprimeur, **tant pis**. Mais l'un et l'autre dédaignent tous ces propos sours, et n'y font pas la moindre attention, **tant mieux**.

On dit que le spectateur tranquille aurait dû ménager un peu plus Simon Sanguinet comme son confrère, et qu'il devait se taire, puisqu'il ne lui en revenait rien de plus, et on l'accuse même d'avoir agi par un esprit de vengeance, **tant pis**. Mes le spectateur, dit-on, avait raison de se venger d'un homme qui ne mérite pas même le moindre coup d'œil d'un honnête homme, et les observations du spectateur l'ont fait connaître, par conséquent mépriser, **tant mieux**.

Il est prouvé qu'il a usurpé une succession, **tant pis**. Mais aussi il paraît clair qu'il restituera honteusement au centuple, **tant mieux**.

Plusieurs approuvent pas que Pierre Ducalvet, Ecuyer, ait mis au jour tant de vérités qui n'étaient pas connues, et il est blâmé d'avoir tout dit, **tant pis**. Mais ses intérêts particuliers et le bien public l'ont obligé de le faire, et toutes ses démarches ont procuré l'avantage qu'il en attendait, **tant mieux**.

On n'a pas été dupe du Sincère Moderne, son adresse est ironique, et s'il était connu on pourrait le rembarrer, et je crois qu'il s'en repentirait, **tant pis**. Mais ne pourrait-il pas faire encore **pis**, et si cela arrivait que dirait-on, **tant mieux**.

Tous les petits Saints se sont ligués contre le Papier Périodique, les auteurs et l'imprimeur, **tant pis**. Mais les grands Saints les couvrent du

leurs ailes; *sub umbra alarum, eorum ambulans, tant mieux.*

Aussi, tout bien considéré on trouvera du *tant pis* et du *tant mieux*.
Tant pis pour les uns et *tant mieux* pour les autres.

No. 80.

From Mémoires de Pierre de Salles Laterrière et ses traverses, édition intime, Québec 1873. Pages 117-119.

"Quelques jours après que ce despote de gouverneur de Haldimand, malgré la majeure partie de son conseil et l'opinion du juge en chef Livius, homme vertueux et juste, et anglais dans toute la force du terme, eut pris sur lui de porter atteinte au privilège du sujet, je vis arriver dans ma chambre comme prisonniers d'Etat aussi, un avocat appelé Jotard et un imprimeur appelé Fleury Mesplet inculpés le premier d'être rédacteur et le second imprimeur d'un papier connu sous le nom de *Tant pis, tant mieux*, du genre libellique, qui se permettait d'attaquer la sage politique du gouvernement anglais et surtout de combattre le despotisme du Suisse Haldimand.

L'éducation de ce Jotard était solide sans être accomplie. Il était satirique et sophistique comme un avocat, avec un front d'airain que rien n'étonnait, ivrogne, faux et menteur comme le diable et grand épicurien; il haïssait tout ce qui était anglais, pour quelle raison? Je ne l'ai jamais pu savoir. En outre il était plein de préjugés, jésuite surtout et fort mauvais ami. Mesplet différait de Jotard par l'éducation, son talent c'était d'être ouvrier imprimeur, il avait des connaissances pourtant; mais il s'en faisait accroire, et ne parlant que d'après son rédacteur d'ailleurs fourbe et menteur presque autant que celui-ci et d'un génie méchant; si son épouse qui était très respectable, ne l'avait adouci, il aurait été capable de bien des choses indignes d'un honnête homme.

Une couple de mois après on amena encore dans ma chambre un écossais du nom de Charles Hay..... accusé disait-on de correspondance avec l'ennemi.....

Me voilà obligé de vivre avec trois étrangers buvant à la même tasse de prisonnier d'état. Je ne fus pas longtemps sans donner la préférence à M. Hay à cause de sobriété et de l'égalité de son humeur ce qui causa de la jalousie aux deux autres; des disputes s'ensuivirent et à la fin des coups. J'étais jeune et vigoureux; bien souvent Hay nous séparait ou le tourne-clefs et la garde était obligée de venir, j'avais affaire à Jotard et à Mesplet ensemble, l'un ne m'attaquait pas sans l'autre ou sans appeler l'autre à son secours; heureusement que je les rossais tous les deux à mon aise et je n'avais besoin que du témoignage de Hay qui connaissait leurs torts, ils ne m'insultaient d'ailleurs que quand ils étaient ivres c'est-à-dire presque tous les après-midis tirant sur le soir. Ce témoignage impartial me mettait à l'abri; ils avaient beau faire et écrire au gouverneur, j'avais toujours raison puisque je me battais à mon corps défendant. Que faire? Disait le gouverneur, le mettre en prison! il y est déjà qu'il y reste donc! Et c'était là toute la satisfaction qu'ils recevaient.

Les épouses de Hay et de Mesplet avaient obtenu permission de venir voir leurs maris.

Pierre de Salles Laterrière was imprisoned at Québec from the 20th of March 1779 to November 1782 for having favoured the invasion of the Bastonnais.

LIST OF APPENDICES.

A. Books printed by Mesplet of which one or more copies still exist arranged chronologically.

B. Books printed by Mesplet extant or mentioned in contemporary writings, arranged according to subject.

C. Documents from Canadian Archives—Haldimand Collection.

1. Letter from C. Berger, Philadelphia, 29th March, 1775, to Fleury Mesplet at Quebec.

2. Anonymous letter with Latin nom de plume, Montreal, 24th February 1778, believed to have been addressed to Mesplet warning him of impending danger.

3. Memorial from Mesplet to Carleton asking permission to publish a newspaper, May 1778.

4. Prospectus of proposed newspaper.

5. Letter from adjutant general, Quebec, 25th June, 1778, to Brigadier General Powell, at Montreal ordering Mesplet to quit the province.

6. Letter from Haldimand at Quebec, 29th June, to Powell at Montreal ordering that Jautard as well as Mesplet quit the province before the 15th of September.

7. Memorial of citizens of Montreal asking Carleton to suspend order for expulsion of Mesplet from the province, August 1778.

8. Notice by Edward Foy, secretary to Governor General, suspending the order for the banishment of Mesplet, Montreal, 24th August, 1778.

9. Extract of a letter from Haldimand, Sorel, 28th Sept., 1778, to Cramahé, Lieut. Governor at Montreal, complaining of an item in "our Gazette."

10. Extract of a letter from Cramahé, Montreal, 1st Oct., 1778, to Haldimand intimating that he had cautioned "our printer" regarding his "penchant to the popular cause."

11. Letter from Mesplet, Montreal, 4th January, 1779, complaining of the persecution to which he has been subjected and asking the person to whom the letter is addressed to help to influence the Governor General in his favour.

12. Poetry offered by Père Well for publication in the Gazette but refused.

13. Letter from Haldimand, Quebec, 15 February, 1779, to Montgolfier, Superior of the Seminary at Montreal, intimating that Mesplet had been warned to desist from attacking the church.

14. Letter from Judge Rouville, Montreal, 27th May, 1779, to Haldimand complaining of Jautard's attitude towards the Court and of his severe criticisms of it in the Gazette of the 26th May 1779, a copy of which he sends with the latter. The articles complained of are a letter "Aux Honnêtes Citoyens," by Valantin Jautard, avocat, describing his being expelled from Court. A letter signed "Le Spectateur Tranquille", (written by Jautard) complimenting Jautard on his dignified demeanour before the Court on his expulsion. A letter by Pierre Ducauvet, to the same purport, and another letter to Judges Rouville and Southouse criticizing their action in expelling Jautard.

15. Letter from Haldimand, Quebec, 1st June, 1779, to Judge Rouville acknowledging receipt of his letter and the Gazette and promising action in the matter.

16. Warrant signed by Haldimand, Quebec, 1st June, 1779, ordering Major Nairn to arrest Mesplet and Jautard.

17. Letter from Haldimand, Quebec, 1st June, 1779, to Major Nairn at Montreal explaining the warrant.

18. Letter from Haldimand same date ordering Nairn to send prisoners to Quebec by schooner Mercury.

19. Order by Haldimand same date for Wm. Halero, commander of Provincial armed schooner to proceed to Montreal with his vessel and there await instructions.

20. Letter from Nairn, Montreal 6th June, to Haldimand advising that Jautard and Mesplet had been arrested and their press and type put under seizure.

21. Extract of a dispatch from Haldimand, Quebec, 7th June, 1779, to Lord Germain, minister at London, advising that Mesplet and Jautard had been arrested for seditious conduct.

22. Petition from Madam Mesplet, 15th July, 1779, asking for the speedy trial of her husband.

23. Petition from Mesplet, 26 Sept., 1780, to Haldimand asking to be set at liberty.

24. Petition from Laterrière and Mesplet, Quebec, 30th April, 1781, to Haldimand asking to be permitted to exercise in prison yard.

25. Extract of a letter from Colonel Daniel Claus, Indian interpreter and agent at Montreal, 27th Sept., 1781, to Haldimand, advising that he had prepared and published a Mohawk primer.

26. Memorial from Jautard and Mesplet, Quebec 7th Aug., 1782, to Haldimand asking for a speedy trial or to be released.

27. Memorial from Madam Mesplet (not dated) to Haldimand asking for her husband's release and offering two sureties for his good behaviour.

D Documents from the manuscript division of Library of Congress.

28. Extract from Journal of Congress, 23rd February, 1776: Resolution to pay Mesplet \$44 for printing.

29. Extract from Journal of Congress: Resolution, 26th February, 1776, to engage Mesplet as printer to go to Canada.

30. Extract from Journal of Congress: Warrant same date to pay Mesplet \$200 for moving to Canada.

31. Extract from Journal of Congress: Resolution, 27th May, 1785, to pay Mesplet \$426 on account of his expenses to Canada.

32. Memorial of Mesplet, Montreal, 1st Aug., 1783, to Congress asking compensation for losses as printer to Congress.

33. Narration by Mesplet of events during journey from Philadelphia to Montreal in 1776, presented to Congress, 1st Aug., 1783.

34. Representations of Mesplet, dated at Montreal, 27th March, 1784, to Congress.

35. Answers of Mesplet to questions by Committee of Congress (no date).

36. Affidavit of Joseph Perinault, Philadelphia, March 31st, 1785 testifying to the espionage to which Mesplet had been subject.

37. Affidavit of Isaac Melchor, same date, testifying to Mesplet's imprisonment at Quebec.

38. Affidavit of P. G. Breton and James Valiant, same date, certifying to Mesplet's setting off as printer for Congress at Montreal.

39. Affidavit of John Germon, interpreter, to Mesplet, same date, confirming Hancock's promise to pay Mesplet's expenses to Montreal.

40. Affidavit of Etienne Fournier, same date, certifying to the vexatious treatment of Mesplet at Montreal.

41. Letter from Tho. Miffin, Philadelphia, 1st April, 1785, to the Hon. Mr. Hardy, of Virginia, at New York, introducing Mesplet.

42. Detailed statement of Mesplet's losses and expenses as printer at Montreal (not dated).

43. Petition from Mesplet to Congress complaining that the \$426 they voted him was altogether inadequate to cover his losses.

E. Extracts from the registers of Notre Dame parish church, Montreal.

44. Birth Josepte Tison, 4 February, 1766 (afterwards called Marie Anne).

45. Death of Marie Mirabeau, 1st wife of Mesplet, 1st Sept., 1789.

46. Marriage of Fleury Mesplet and Marie Anne Tison, 13th April, 1790.

47. Mesplet godfather to his brother-in-law Fleury Tison, 39th Oct., 1791.

48. Mesplet godfather to Marie Therese Stringer, 30th Oct., 1791.

49. Death of Fleury Mesplet, 24th January, 1794.

50. Death of Marie Anne Tison, 2nd wife of Mesplet, 4th Sept., 1840.

F. Documents from the Notarial Archives at Court house, Montreal, Pierre Mézières, notary.

51. Deed of compromise between C. Berger and Mesplet for settling old partnership by arbitrators, dated 3rd Nov., 1789.

52. Extension of time for making award, 16th Nov., 1784.

53. Award of arbitrators, 27th Nov., 1784.

54. Deed of settlement with bond from Mesplet to Berger, 29th Dec., 1784.

55. Power of attorney from Berger to Louis Hardy et al, to collect amount due by Mesplet.

François Leguay, père, notary.

56. Bond from Mesplet to Joseph Marie Desautels, 30th Aug., 1784.

57. Receipt in full for above bond, 22nd February, 1794.

58. Draft of a deed of compromise between Mesplet and his creditors, 9th July, 1785.

59. Desautels declines to sign above deed of compromise (not dated).

60. List of Mesplet's liabilities.

61. Bailiff's sale with inventory of Mesplet's effects, 21st Nov., 1785, and following days.

A. Foucher, notary.

62. Lease of a house by J. B. Tabau to Mesplet, 14th April, 1788.

John Guillaume Delisle, notary.

63. Engagement of Alex. Gunn as apprentice by Mesplet, 5th Dec., 1789.

64. Marriage contract between Fleury Mesplet and Marie Anne Tison, 11th April, 1790.

65. Bond from Mesplet and wife to Charles Lusignan, 20th Dec., 1790.
66. Intervention of J. B. Tison guaranteeing above bond, 8th Jany., 1793.
67. Discharge of above bond, 11th Dec., 1795.
68. Lease of a house by widow of Ignace Chenier to Mesplet, 26th March, 1793.
69. Bond from Mesplet and wife to J. B. Durocher, 26th July, 1793.
70. Compromise of and intervention by Tison in above bond, 11th Dec., 1795.
71. Transfer of above bond by Durocher to Pierre Huguet-Latour, 20th March, 1797.
72. Discharge of above bond by Pierre Huguet-Latour, 22nd Nov. 1797.
73. Inventory of Mesplet's effects, 17-20 February, 1797.
74. Renunciation by Madam Mesplet of participation in estate of her late husband, 20th February, 1794.
75. Sale of effects of Mesplet estate, 24-27 February, 1794.
76. Power of attorney from L. Hardy, curator of estate Mesplet to Michel Dubord, 18th June, 1794.

G. Miscellaneous.

77. Extract from the will of J. B. Tison showing legacy to Marie Anne Tison (widow Mesplet, 27 Nov., 1794).
78. Judgment of Court of Common pleas against Mesplet in favour of Desautels for £370 5s 5d, 22nd July, 1785.
79. Extract from La Gazette Littéraire of 2nd June, 1779, an article entitled *Tant pis, tant mieux*. The origin of the idea that there was a newspaper of that title.
80. Extract from the mémoires of Laterrière giving a description of Mesplet.

IV.—*The Downfall of the Huron Nation.*

By C. C. JAMES.

(Annual popular lecture, delivered May 23, 1906.)

Eight miles from Quebec is a little village overlooking the valley of the St. Charles River. In the cabins clustered about the church dwell the Hurons of Lorette, a remnant of an old Indian tribe.

We come west nearly 750 miles to the Detroit river. In Sandwich we may see still standing the old Huron Mission House. Here and there along the river we find settlers who are very proud to trace their origin back to the aristocratic Wyandotts. A short distance above Amherstburg the electric railway takes you past the Wyandott burial ground where, conspicuous above the rest, rises the tall shaft marking the grave of Mondoron¹ Joseph White, Chief of the Hurons or Wyandotts. On the Michigan side of the river is the City of Wyandott. tradition, place name, and local history all bear traces of the early and continued presence of the Hurons or Wyandotts along both banks of the river.

A little further south, in Ohio, we come to the Counties of Huron and Wyandot. We cross the Mississippi, and in Kansas we find another Wyandot County and a Wyandot City.

Further south we reach the Indian Territory in the north east corner of which is the Wyandott Settlement or Reserve, where the Wyandotts and their old enemies the Senecas live peaceably side by side.

Quebec, the Detroit, and the Indian Territory are far removed from one another. We enquire as to the story of these three groups of Hurons and we learn that they all trace back to Lake Huron, to that section of the Province of Ontario which lies between lake Simcoe and the Georgian Bay. It is the story of the dispersion, the decimation, or the downfall of the Hurons, that I have been asked to tell you to-night.

This story of the Hurons takes us back 260 years and more to the very earliest chapters in the history of the inhabitants of Ontario. Preceding it there is little that can be substantiated. When we would go further back we enter the field of tradition and of speculation.

The story that I am briefly to recount is not a new tale, it is not a piece of original investigation—it is merely an attempt to present in

¹ Inscription as follows:—Mondoron, chief of the Wyandotts or Hurons, Joseph White, Born January 19, 1808; Died February 18, 1885.

popular form some of the main features of a story that is one of the most thrilling when studied in its details, a story that fills a unique place in the history of Canada, and one which we may revive even if we add nothing new or original.

The history and downfall of the Hurons may be studied in three sources.

1st. The traditions of the Indians themselves.

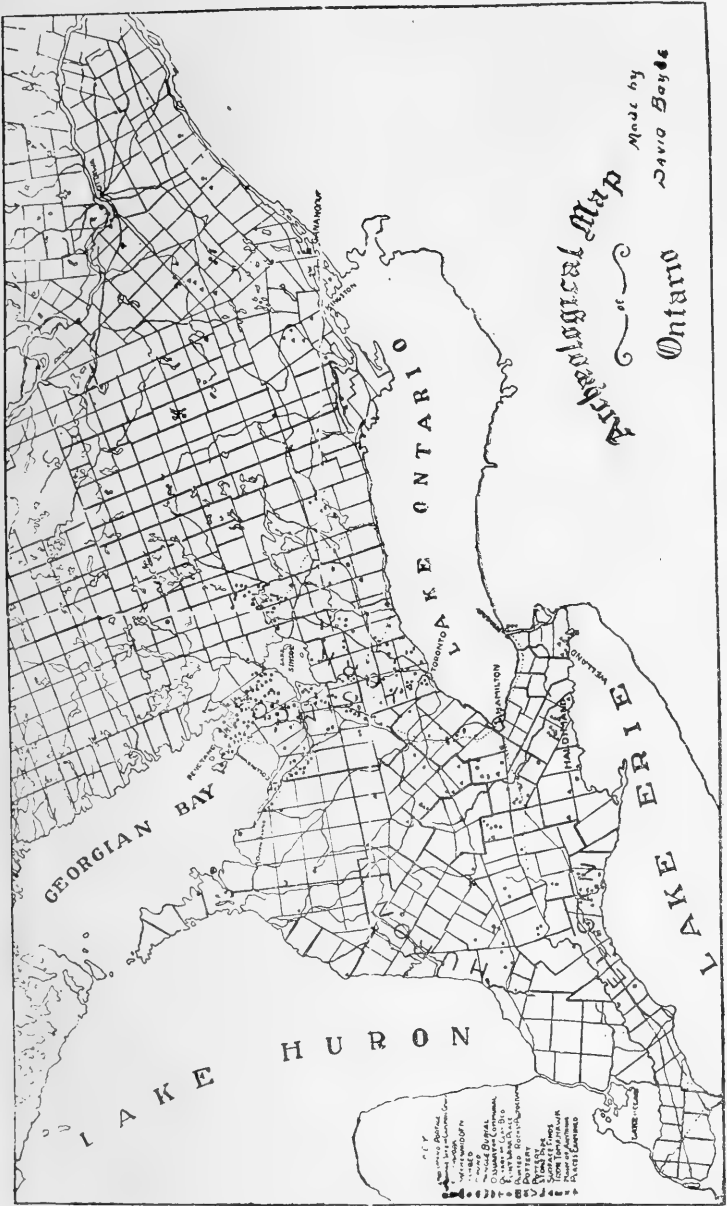
2nd. The letters of the Jesuit Fathers, the written records commonly called The Jesuit Relations.

3rd. Modern archæological researches and ethnological investigations.

These three contributors to a common story are widely different in method, and when they verify one another we are bound to accept the conclusions as facts of history. The dispersion of the Hurons by the Iroquois in 1649 is the first authentic chapter in the history of Ontario, and yet the main features of that story are as well established as any historical event in Canadian history. Indian traditions, the witness of the Jesuit Fathers, and the researches of archæologists during the past fifty years are gradually being brought into harmony in the working out of the details of this history.

When Jacques Cartier sailed into the St. Lawrence in 1535 he found Indians of the Huron-Iroquois stock at Quebec and Montreal, or as the settlements were then called Stadacona and Hochelaga, and even an adventurous band of Huron fishermen as far east as Gaspé. When Champlain came eighty years later, he found that the valley of the St. Lawrence was occupied by Algonquins, and that the Hurons and the Iroquois had moved westward. We may go to the Indian traditions for an explanation. Peter Dooyentate Clarke, a Wyandott of the Detroit River, has left us a book of Wyandott traditions and Mr. Wm. E. Connelly of Kansas has for twenty years studied the language, the myths and legends of the Wyandotts of the Indian Territory.

According to Connelly the traditional home of tribal origin was in Northern Quebec, or in the region between James Bay and Labrador, where the Wyandotts were near neighbours to the Eskimo. They gradually moved southward to the St. Lawrence, where Cartier found them. On the south bank were the Senecas or Iroquois, another branch of a parent stock. Hochelaga was a Seneca village. From choice or necessity the Wyandotts migrated westward along the south shore of Lake Ontario. They crossed the Niagara and, moving eastward, made a settlement on a bay which they called "Toronto." This word Toronto in the Wyandott language means "the land of plenty." Probably through pressure from the Iroquois, who had followed and settled in New



York State, they had to move on and they brought up on the shores of Georgian Bay, next door neighbours to a branch of their family that had preceded them, the Hurons who lived between Lake Simcoe and Matchedash Bay.

Horatio Hale in his introduction to "The Iroquois Book of Rites" (pp. 10, 11) quotes from Clarke's traditions, which, in the main, agree with Connelly's record. He also traces the original seat of the Huron-Iroquois to the Lower St. Lawrence. Hale puts it briefly thus: "As their numbers increased, dissensions arose. The hive swarmed, and band after band moved off to the west and south." This "swarming of the hive" has ever since been a favourite expression with writers and students of the Huron-Iroquois race.

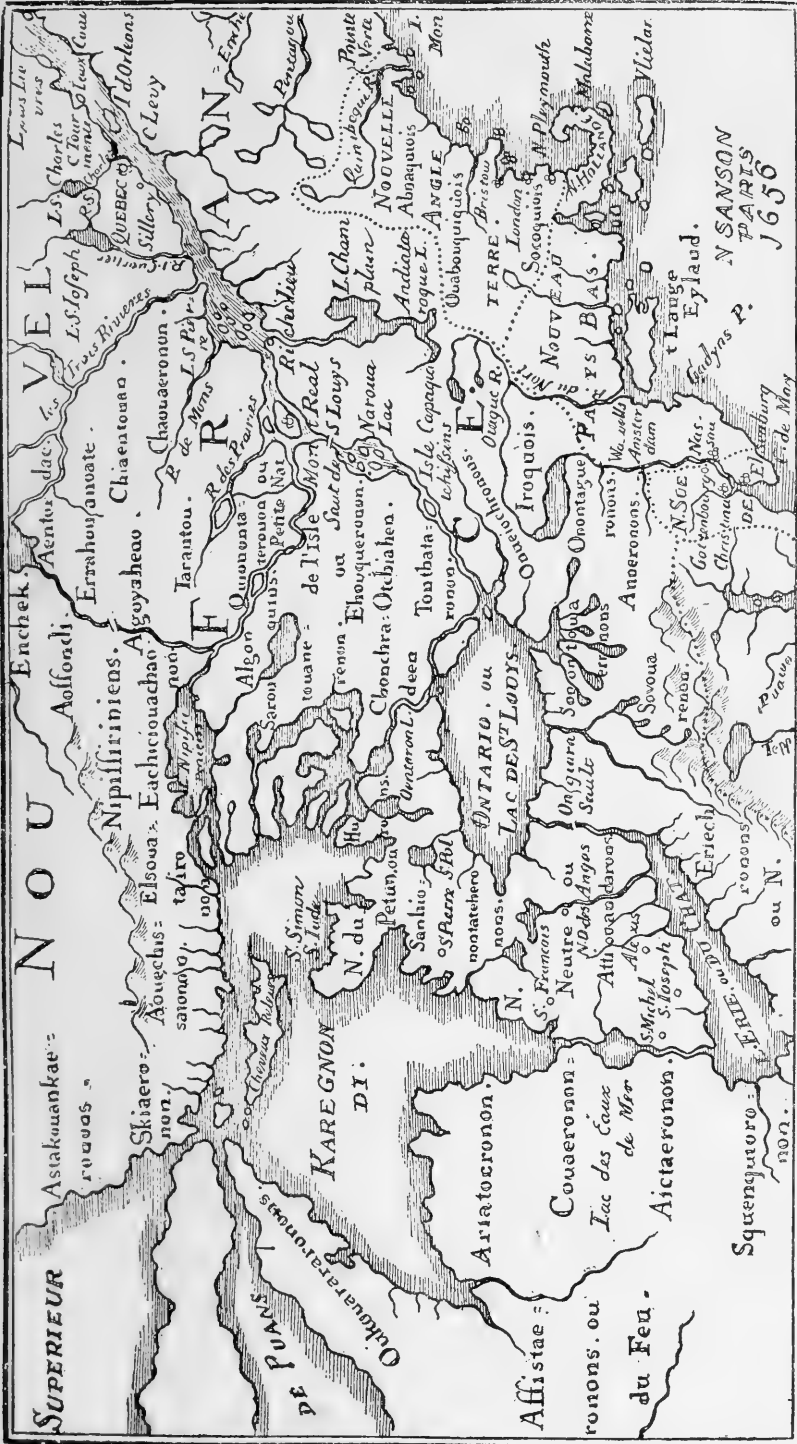
Now let us briefly locate the principal swarms. First of all, there were the Hurons on Georgian Bay between Matchedash Bay and Notawasaga Bay, occupying part of the present County of Simcoe. West of them were the Tobacco Nation, the Tionnontates or Petuns. South of them, in the district from Niagara to the Detroit, were the Neuters or Neutral Nation. On the South Shore of Lake Erie were the Eries or Cat Nation. Southeast of them on the Susquehannah were the Andastes or Conestogas. Along the South Shore of Lake Ontario in Central New York were the Five Nations of the Iroquois. If we add the Tuscaroras or sixth Iroquois Nation we have the principal nations that had originated in Quebec and, that, before Champlain's time, had moved west and taken up the districts that we have referred to. Ethnologists tell us that their languages were very similar; the traditions of these nations all point to long intercourse and close relationship in origin; archaeologists have determined a similarity of life; the Jesuit Fathers also refer again and again to their kinship.

The Hurons were so called by the French because they wore part of their hair standing straight up like the bristles on a wild boar. Their own name was Ouendat or Wyandott.

The Tobacco Nation was so called because they were growers of that article. Their Indian name was Tionnontates, their French name *Petun*.

The Neutrals were so called because, in the terrible wars between the Iroquois and the Hurons, they maintained neutrality. The Indian name of the Neutrals was Attiwendaronk, which, according to the Relation of 1641, meant in the Huron language "people of a speech a little different."

The Eries were also called the Cats because of the prevalence of racoons in their country.



SANSON'S MAP OF 1656,

The question might now be asked as to why the Hurons had located on the shores of Georgian Bay. Perhaps we can suggest an answer. If it be correct that they were gradually pushed out or driven across the Niagara and Lake Ontario by the Iroquois, we can readily understand that they would seek refuge in a locality where they could most effectively defend themselves, and would probably limit their retreat only by their necessities of living. The Hurons were a sedentary not a migratory tribe; they were growers of crops rather than hunters. They stopped when they came to the borders of the non-arable Muskoka and they took up territory that was in part protected by water.

A study of the traditions of the Huron-Iroquois people does not give us any information as to their intercourse with the Eskimo. We learn that in the far off days they crossed a great river and we know that about the beginning of the sixteenth century they came away from the valley of the St. Lawrence. But this great river that they crossed may have been the Ohio or the Mississippi.

The question now becomes a subject for investigation by archæologists and ethnologists.

I have had the opportunity of reading a most interesting and well worked out paper by Dr. David Boyle, Archæologist to the Ontario Government, on the origin of the Iroquois and kindred nations. It will appear in the forth coming report on Ontario Archæology.¹ Mr. Boyle argues for a southern origin of these people beyond the Ohio, if not beyond the Mississippi, instead of beyond the St. Lawrence in Quebec. He brings them from the south until they come into neighbourhood with the Micmacs of New Brunswick, thus accounting for the traditions of that people recorded by Dr. Rand. Thence they came up the St. Lawrence. After many years swarm after swarm moved off to occupy the territories in which they were found at the time of Champlain. The fact that the Hurons and Petuns were skilled in the cultivation of corn, tobacco, beans, sunflowers and hemp is better explained by a southern origin than by tracing them away to the Labrador home of the Eskimo. I cannot too strongly urge you to read and study this paper when it appears in print.

We come now to the Huron Nation as it was in the early part of the 17th Century, when the French first visited them. Their old village sites can be traced through York County up into Simcoe, becoming more and more numerous as they were crowded by the limitations of the land. Only in the north are relics of French manufacture to be found, hence we conclude that the northern towns were the more recently occupied.

¹ See Annual Archæological Report 1905 (Toronto 1906) pp. 146-158.

The Hurons proper occupied the five townships lying between Matchedash Bay, Nottawasaga Bay and Lakes Simcoe and Couchiching. The eastern entrance by land was across "The Narrows" between the two lakes, where the town of Orillia now stands.

They were a settled nation living in fixed towns. The villages on the frontier next to their enemies were strongly fortified by walls of palisades similar to those erected by the Iroquois. The sites of these towns would naturally be selected with a view to protection. Wood and water supply would also have to be considered. The records of the French give us a population varying from 15,000 to 45,000. These variations in number can readily be accounted for but taking the number at 30,000 we see that the district carried a heavy population, as Indian population was usually distributed. The towns occupied at that time were all crowded into the townships of Tiny, Flos, Medonte and the southern part of Orillia, with one here and there in Oro and the northern part of Orillia.

The latest census population of these townships was 26,371. If to this we add the three towns Orillia, (4,907), Midland, (3,174), and Penetanguishene, (2,422), we get a total population of 36,874. It may assist us to form some idea of the population of the Huron Nation, when we say that, in the days before the war of extermination began, the Indian population of the district about equalled that of the present day even including the three towns mentioned. The next point that suggests itself is that with such a heavy population, game could not have been very plentiful. If they wished to hunt they must go north into the Algonquin Park, or south into the Neutral Country.

But the Hurons were rather farmers, fishermen and traders. They did not maintain themselves by hunting—they were on a higher level than the Algonquins, the white Indians of the northern forest. They lived in towns and they raised crops. Corn, beans, pumpkins, sunflowers and hemp were their principal crops. The corn, which was their main article of food, was doubtless similar to that which may still be found in the reserve on the Grand River,—small ears of hard flinty corn with bluish kernels. It was grown in the same hills year after year until the soil became exhausted. Traces of old corn fields of the Indians can still be seen in the woods along Lake Erie and in Nottawasaga Township. The sunflowers were grown mainly for oil with which they anointed or smeared their bodies and hair and for sacrificial purposes. Oil for food was got from fish. The hemp was grown for fishing nets and for the many uses of cord.

When the supply of wood gave out or the soil became exhausted, the town was moved to a new site. This accounts for the very large number of old village sites in Simcoe County and, taken in connection

with the crowded population, explains why that district is the richest archæological field in Canada, and is one of the richest in all America, north of the Mexican boundary.

The Hurons also were fishermen,—the deeply indented inlets of Georgian Bay and the lakes Simcoe and Couchiching affording a plentiful supply of fish. At "The Narrows" near Orillia might still be seen a few years ago some of the stakes of the old fish weir of the Hurons. It was from these fish stakes or hurdles that the old French name *Lac La Clie* was given to Lake Simcoe.

The Hurons also were traders for themselves and for the neighbouring tribes. They raised the crops that we have mentioned and engaged in barter. From the Neutrals they got furs, from their brethren of the Tobacco Nation they got tobacco, and from the Algonquins they obtained the skins of the beaver, bear, deer and moose. Having a surplus they started in their birch bark canoes for Three Rivers and Quebec to dispose of their packs to the French traders. The ever alert Iroquois guarded the front route by lake and river, hence they were compelled to take the route up the French River, across Lake Nipissing and down the Ottawa. The Iroquois traded with the Dutch by way of the Mohawk and the Hudson. Once start a conflict between these two Indian nations and then bring in two European nations competing for the trade in peltries, and you have good and sufficient ground for the continuance of the fight to the bitter end. Even in this commercial struggle the Neutral Indians remained neutral and we wonder why. Was it because they feared to take out their loads of furs past the Iroquois frontier, or was it because the Hurons were skilful in the use of the birch bark canoe? Probably both. The fact is, however, that the Hurons were the fur traders for a large area and through their annual trips to Quebec maintained a direct connection between their home on Georgian Bay and the headquarters of the French at Quebec. There is much in this to explain the story that follows. A people living in fixed fortified towns, producing crops and engaging in trade must impress one as being of a superior type, even if that type is savage.

What of the house or home life of the Hurons? The migratory hunters of the plains and the Algonquins of the great pine and spruce forests of the north lived in wigwams of skins and bark, but the fixed Huron-Iroquois Nations lived in what may be described as houses or cabins. Their construction was somewhat as follows: Two parallel rows of tall saplings were planted in the ground, bent together at the top until there was left an open space of a foot or so in width along the ridge, and then lashed together so as to form a sort of arbor or booth about thirty feet in width at the bottom and about twenty feet in height. Other poles were tied securely to these upright poles and then the sides

were sheathed in bark overlapping to shed the rain and snow. Another row of horizontal poles kept these huge bark shingles in place. Along either side of the interior were scaffolds or bunks about four feet from the ground which, when covered with furs, furnished the sleeping compartments. The space beneath was the store-house for fuel and cooking utensils. There was a compartment at the end of the house used as a storeroom for corn, fish, sunflowers and other articles of food. Along the upper poles were hung their bows and arrows, clothing, skins and clusters of ear corn. Down the middle were the fires, each one furnishing heat for two families. The smoke escaped by the long narrow opening left at the top of the house. These houses varied in length, in some cases being 200 feet in length. The long houses were not necessarily straight but followed the configuration of the land upon which they were constructed. Picture to yourself such a house, an abnormal sleeping car with ten fires built down the aisle and crowded with twenty Indian families. You will at once understand that such a house might be a bedlam, reeking with smoke, where privacy was unknown and where the customs of even early civilization could scarce find room for development. The effect of a spirit infected brawler, a half-crazed medicine man or the victim of an infectious disease may be more readily imagined than described.

Perhaps the pen of a ready writer or the tongue of one gifted with rare imagination might weave a story of romance about the fires of one of these Huron long houses, but a careful reading of the descriptions of the Jesuit Fathers, eye-witnesses of their degraded life, compels us to say that the romance existed mainly in the imagination of the writer.

I give you one passing picture from the pen of Parkman:

"He who entered on a winter night beheld a strange spectacle: the vista of fires lighting the smoky concave; the bronzed groups encircling each,—cooking, eating, gambling or amusing themselves with idle badinage; shrivelled squaws, hideous with three score years of hardship; grisly old warriors, scarred with Iroquois warclubs; young aspirants, whose honours were yet to be won; damsels gay with ochre and wampum; restless children pellmell with restless dogs. Now a tongue of resinous flame painted each with feature in vivid light; now the fitful gleam expired, and the group vanished from sight, as their nation has vanished from history."

(Introduction to "The Jesuits in North America." p 14.)

Before we tell how the Iroquois flung themselves like a bomb into the midst of this people and scattered the survivors in so many directions, we must introduce into the story the element that adds so much human interest to the tale.

Erect fifty to one hundred of these houses in an irregular group and you will have a Huron town; set up twenty of these towns in an area of about twenty-five miles square; fortify with palisades those on the east and south and you have the Huron Nation which Brebeuf estimated in 1635 to be composed of 30,000 souls.

The Jesuit Fathers came to Quebec to christianize the savages and they selected the Hurons as the special field of their mission. The question at once arises as to why they chose this people so far removed from Quebec. They were the traders who came down every year from the great upper country with their canoes packed with furs; they were a sedentary nation; Champlain had formed a sort of alliance with them against their enemies of the south; the Recollet Fathers had been back and forth from 1615 to 1628; and Lalemant in his Relation of 1639 states that the Huron Country was "one of the principal fortresses and like a donjon keep of the devils." If the evil one could be over-thrown among the terrible Hurons the way would be opened up for the conversion of the Tionnontates or Tobacco Nation, the Neutrals, the Eries, the Andastes and possibly even the Six Nations. The very dangers of the Huron Nation appealed with special attractiveness to the devoted Jesuits, who gladly went in by the one door open to them to the great Huron-Iroquois nations even if that door led to martyrdom. The history of humanity has given us many pictures of the sacrifice of man for his fellowmen, but apart from the great sacrifice of the Saviour of mankind and the sufferings of the martyrs of the early church, it is doubtful whether there is any other picture quite so thrilling and so full of human suffering as the self-sacrificing of the Jesuit missionaries for the salvation of the Huron Nation.

I need not enter into the details of the visit of Champlain to the Huron Nation. You are doubtless familiar with the main facts,—how on a tour of exploration he went up the Ottawa in the summer of 1615, crossed by Lake Nipissing and the French River to Georgian Bay and arrived at the Huron Country. He found the people living in eighteen villages divided among four tribes. A great gathering of the Indians assembled at the village of Cahiagué and it was decided to send a band to attack the Iroquois. Champlain decided to accompany them. They left Cahiagué, a village of about two hundred cabins, situated at or near Orillia, on the 1st of September and paddled their flotilla of canoes down the Trent to Lake Ontario. The Andastes, their southern allies were to have assisted. After five weeks' journey they had crossed Lake Ontario and had come into the enemies' country. Their allies had failed to come to their help, the Hurons were repulsed, and on the 18th of October were retreating across the eastern end of Lake Ontario. Champlain was compelled to spend the winter with the Hurons. Along

with the Recollet Father Le Caron he visited the Tobacco Nation on the southern shore of Georgian Bay, and in May started on his return journey to Quebec. The effect of Champlain's visit was to confirm the Iroquois in the belief that the French were the allies of their enemies. Champlain did not go down into the Neutral Country, and we can thus readily understand why his map is so faulty in its delineation of Lake Erie.

The mission of the Recollet Fathers gave place to that of the Jesuits, and it is with the latter that our story of the Hurons is most intimately concerned. We ought, however, in passing, to mention that it is to one of the Recollet missionaries, Gabriel Sagard, that we owe the first history of the Hurons and a Dictionary of the Huron language published in France in 1632. The new edition published in 1865 is the one available for students. Although Brebeuf and de Noué had spent some time among the Hurons between 1626 and 1629 the beginning of the Jesuit Mission properly so called, may be set down for the year 1634. It lasted until 1649. In these fifteen years twenty-five Jesuit missionaries carried on their work in Huronia, and five of this devoted band suffered martyrdom in the Huron country.

Time does not permit to tell the story of their missionary work in detail—to be fully comprehended one must read the letters and records preserved for us in the Jesuit Relations now available in all large Canadian libraries in that magnificent production put out some years ago in 73 volumes by the Burrows Brothers of Cleveland. Or it may be that you still remember the story told by Parkman, based on the Relations, in his volume "The Jesuits in North America." We must be brief in our statement. The Jesuits after much perseverance and privation, reached Huronia and took up their abode at Ihonatiria, which they named St. Joseph. Gradually they sought out village after village endeavouring to persuade the savages to embrace the faith of Christianity and to permit their children to be baptised. With a view to permanency they erected in 1639 a head-quarters of their own, choosing a spot on the River Wye, a little east of Penetanguishene. Here they enclosed a small plot of ground with a stone wall and wooden barricade. Within they erected their chapel, mission house and hospital, and without the walls a hostel. From this place as a centre, which they called St. Mary, they sent out their missionaries not only to all villages of the Hurons, but also to the Tobacco Nation, and even down into the country of the Neutrals. They kept up their communication with the Church at Quebec by means of the trading parties that went down every summer by way of the French River and the Ottawa. The sufferings of this devoted band of missionaries can scarcely be realized. They were

reviled and persecuted, their lives were threatened, they had to submit to all manners of degradation, but they remained faithful at their posts, appearing even to welcome persecution and privation that they might advance the cause of Christianity.

The old rivalry between the Iroquois and the Hurons became more intense and soon there reached this country the reports of forays and depredations of the Iroquois on the St. Lawrence. As we read now the account of the Iroquois expeditions it would seem that a great plan of campaign had been laid down, as though by some Master General. The Iroquois had determined to annihilate all their old enemies and rivals. It was not the impulse of a sudden attack but an extensive campaign that appears Napoleonic in its extent. The Iroquois were now raiding in one direction, a few weeks later in another; one hand was supporting another; even the old Ottawa was unsafe. But the Hurons planned nothing in return. They were oblivious of their danger,—they were improvident. The Jesuit Fathers had advised them to strengthen their villages and improve their methods of defence, but the Hurons were not so far seeing as the Iroquois. Moreover, the Dutch traders had furnished the Iroquois with guns and powder and thus given them a most decided advantage. The Iroquois gradually extended their operations and about 1647 a band came in by way of "The Narrows" between Lakes Simcoe and Couchiching, and captured the nearest Huron village Contarea, killing many and taking the remainder back as prisoners to incorporate them in their own nation. Years after Jesuit missionaries found them in the Iroquois country and were delighted to find that they had not forgotten all their teachings. Again the Iroquois came back in 1648 and took the second village, Teanaustaye or St. Joseph II. In this fight the first Jesuit missionary was killed, Father Daniel.

The work of the Iroquois was thorough: the village was completely destroyed by fire, the inhabitants cut down and 700 who could not escape were taken back as prisoners to be tortured or to be incorporated in their own nation. 1649 saw the Iroquois once more return, but earlier, before the snows of winter had all disappeared. They pushed further up into the peninsula. St. Ignace fell before them, and then, but two miles further on, St. Louis. The smoke of burning St. Louis could be seen from the Jesuit Mission of St. Mary on the Wye, but little did the missionaries there think as they saw the smoke arising that even then their own brethren Brebeuf and Lalemant had been captured and taken back to St. Ignace to suffer most cruel tortures. The story of the death of these two missionaries is one of the most terrible tales in the history of the human race. After the retreat of the Iroquois, the brethren from the mission found the mangled and charred bodies of the two martyrs,



THE SITE OF ST. IGNACE (ON THE HILL) WHERE, ACCORDING TO REV. A. E. JONES S.J., BREBŒUF AND LALEMANT WERE TORTURED TO DEATH.

the heroic Brebœuf founder of the Huron Mission, and his frail but resolute companion Lalemant. They laid their bodies in the little burial plot at St. Mary on the Wye until their return to Quebec when they carried with them the treasured remains of their martyred brethren. Ragueneau, Bressani, and other French priests and their assistants prepared for an attack upon the head mission, but it did not come. The Iroquois were retreating homeward laden with spoils, but the Hurons who were left were in a panic. Town after town was abandoned or destroyed. Some fled westward to the rocky gorges in the Blue Mountains or to the Tobacco Nation; but most of them were crowding towards the northwest promontary of the Huron country. Beyond this lay the island of Ahoendoe, St. Joseph, and further on Ekaentoton or Manitoulin. Whither should they go? The Jesuits prepared to renew their mission on Manitoulin, but the Hurons were bound to settle upon the nearer island. The end of a long conference was that the Jesuits decided to stay with the Hurons. St. Mary on the Wye was given to the flames and a new St. Mary erected upon St. Joseph, the island now known as Christian Island.

The late snows of March had been reddened by the blood of Brebeuf and Lalemant; the early snows of December the same year were to be reddened by the blood of two others of the Jesuit Fathers. Late in the year the Iroquois returned, this time to wreak havoc among the villages of the Tobacco or Petun Nation. Among this people there were two missions served by four priests. St. Mathias, a village on the Pretty River, located near Ekarenmiondi or the Standing Rock, and St. John, a few miles southwest of it, were captured. Father Garnier was killed on the 7th of December and his remains lie buried in a grave still undiscovered somewhere to the southwest of Collingwood. On the following day Father Chabanel was killed at the mouth of the Nottawasaga River. Then began the dispersion of the Petuns, Tionnontates or Tobacco Nation, relatives of and practically forming part of the Huron Nation. Some may have escaped southward to the Detroit, but most of them followed the Hurons northward towards Manitoulin and the Straits of Mackinac.

Having dispersed the Hurons and their neighbours the Tobacco Nation, the Iroquois next destroyed the Neutrals, and then turning their attention to the Eries on the south side of the lake, blotted out that people and thus made themselves master of the whole country formerly divided among the different members of the great Huron-Iroquois family. When the Huron Mission was started in 1634 there were Hurons, Petuns, Neutrals, Eries, Andastes and Iroquois; in less than a quarter of a century only the Iroquois were left. In this short time one

of the great tragedies of the human race had been wrought and people after people had well nigh been wiped off the face of the earth.

But so-called extermination is never quite complete,—there are usually some remnants. The tracing of the remnants of the Hurons and the Petuns is the next chapter in our story. Following the notes of Father Martin, who edited the Canadian edition of Bressani's history¹ of the Jesuits in New France, we can divide the remnants into five groups.

1. A considerable number of the Hurons became incorporated in the Iroquois Nation. Many were taken prisoners and adopted into the confederacy; others, strange to say, appear to have gone by choice. They maintained their identity for many years.

2. Another band sought refuge among the Eries only to be wiped out later on when the Iroquois so completely destroyed that nation.

3. In the year following the great dispersion the Jesuit priests, accompanied by a band of Hurons, set out from Christian Island, taking the old trade route. After running the gauntlet of Iroquois guerilla bands, they finally reached Quebec. The Hurons were settled upon the Island of Orleans.² Thither the relentless Iroquois followed them and made life so uncertain that, after eight years of ceaseless attacks, they sought shelter for a time right in the heart of the city adjacent to the fort. Afterwards they were removed to Beauport, again to old Lorette, and in 1679 finally located at new Lorette, Huron Lorette, as it is called, where their descendants live to this day, making moccasins and snowshoes, embroidering fancy deerskin articles and also acting as guides to the hunters and tourists. Their houses or cabins cluster about the old church, erected in 1731, in imitation of the Casa Saneta of Lorette in Italy.

This little band of 300, at Lorette, is much visited by tourists to old Quebec. Many writers in mistake refer to it as the sole remnant of the old Hurons. As it is so well known and is kept so much in public view, we need make no further reference to it than to repeat the words of Father Martin, written in 1852:

"There (at Lorette) is found in our day all that remains of this Nation once so celebrated. After having lost its country, its language, its customs and a part of its nationality, it is disappearing little by little

¹ See appendix to Bressani's *Missions des Jesuites dans la Nouvelle France*. (Montreal, 1852) pp. 309-318.

² Students interested in following up the history of the dispersed Hurons should read the story of Dollar's Defence of the Long Sault. See Parkman's *The old Regime in Canada*, chapter VI and Burrows *Jesuit Relations* vol. XLV p. 241 chapter IV of Relation of 1659-60 "Of the Condition of the Huron Nation and of its latest defeat by the Iroquois Nation."



EKARENNIONDI, "THE STANDING ROCK."

(Photo. taken in 1906 by members of the Huron Institute of Collingwood, Ont.

day after day. It resembles a tree that has never taken firm root in the soil to which it has been transplanted. Deprived of its life-giving sap, its withered leaves drop off one by one without which it cannot hope for a new spring time to renew the freshness of its youth. There will soon remain no other trace of this powerful Nation than a name justly renowned in our annals."

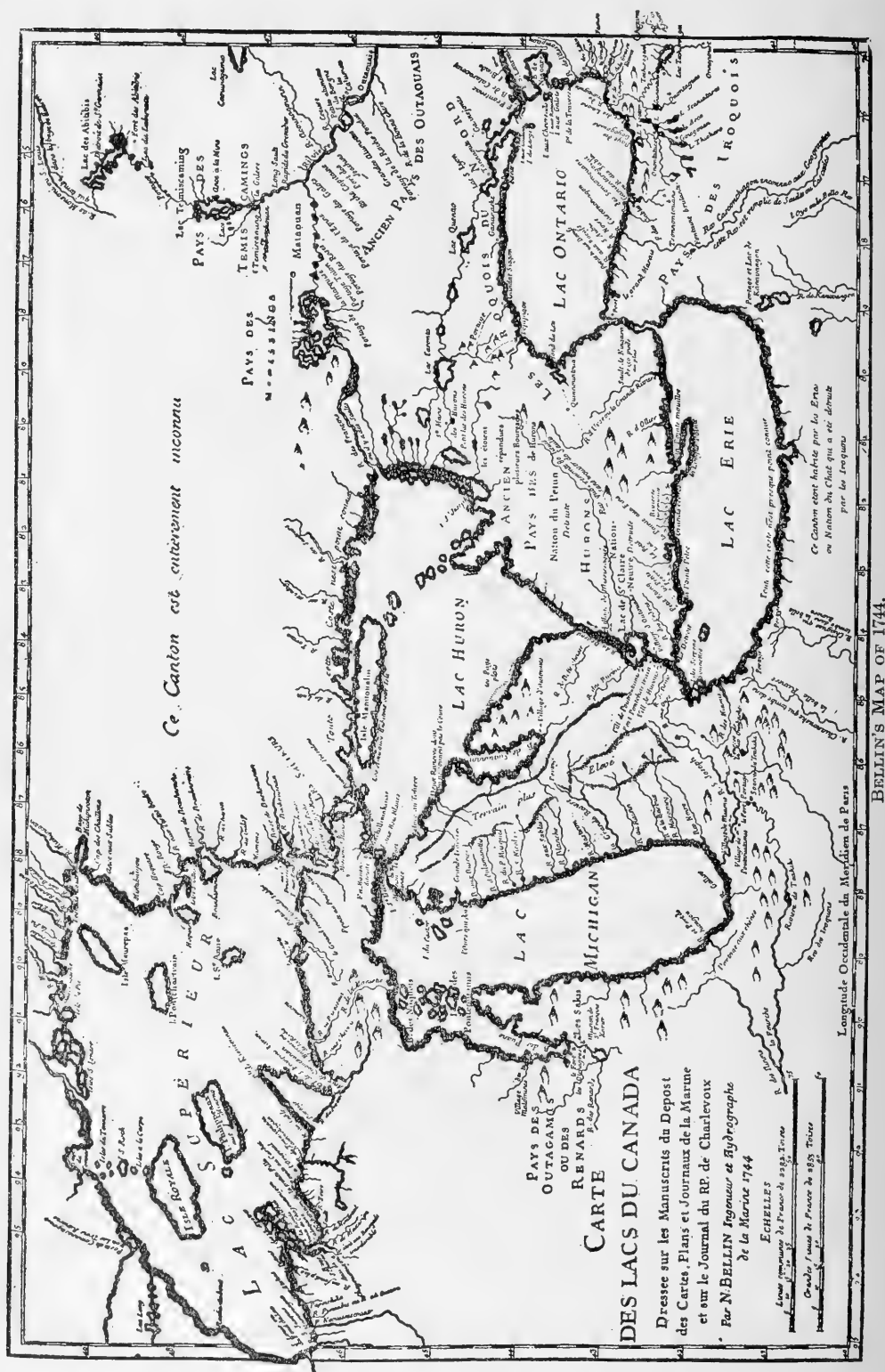
4. Another band crossed from Christian Island to Manitoulin, but the Iroquois were on their trail, and after a sojourn of a few years, they loaded their canoes and headed for the mouth of the French River—they were off for Quebec to join their brethren who had preceded them.

5. The last section of the fugitives sought a home at Michilimackinac Island, whence, on pressure from the Iroquois, they fled to the forests of the west. After much wandering they returned and settled on the shores of Lake Superior. Here a new home was established at St. Esprit alongside a band of the Ottawas. Another enemy came to worry them, an enemy from the west this time, the Sioux. Father Marquette now comes upon the scene and enters into their history. The home upon Lake Superior is broken up; the Ottawas go down to Manitoulin and Father Marquette and the Hurons form a new settlement and mission opposite the Island of Mackinac in 1670, to which the cherished name of St. Ignace is given. It may be interesting to note that it was probably some of these Huron Indians who accompanied Marquette in his discovery of the Mississippi.¹

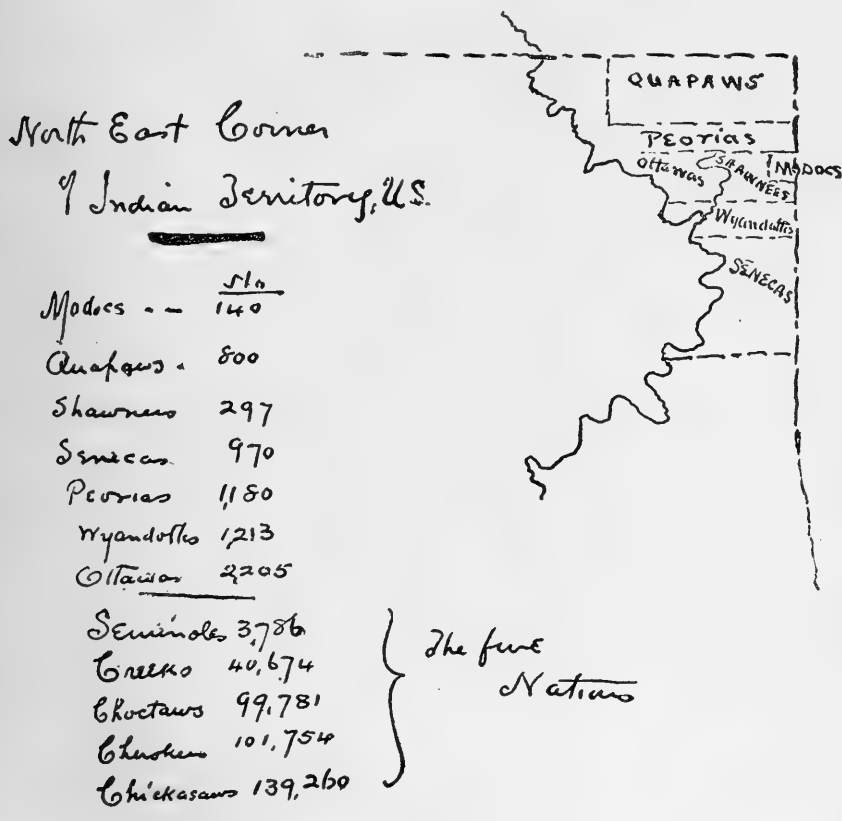
The story of this band, however, is not yet told. St. Ignace still remains a mission upon the Straits of Mackinac, but the wanderings of the Hurons were not yet done. Towards the end of the 17th century a considerable portion of the Hurons of this mission moved southward towards the Detroit River and formed three settlements, one on the east

¹ My attention has been called by Mr. Benjamin Sulte to the suggestion that these refugee Hurons had in their western wanderings found the Mississippi and told Marquette of the great river of the west. The following extract is from the Relation of 1659-1660. It is taken from p. 235, vol XLV of the Burrows edition.

"During the winter season our two Frenchmen (Radisson and Groseilliers) made divers excursions to the surrounding tribes. Among other things, they said, six days' journey beyond the lake (Superior) toward the southwest, a tribe composed of the remnants of the Hurons of the Tobacco Nation, who have been compelled by the Iroquois to forsake their native land, and bury themselves so deep in the forests that they cannot be found by their enemies. These poor people—fleeing and pushing their way over mountains and rocks, through these vast unknown forests—fortunately encountered a beautiful river, large, wide, deep and worthy of comparison, they say, with our great river, St. Lawrence. On its banks they found a great nation of the Alimimec which gave them a very kind reception. This Nation comprises sixty villages—which confirms us in the knowledge that we already possessed, concerning many thousands of people who fill all these western regions."



bank of the River, another on the west bank, and the third on the south shore of Lake Erie in Ohio near Sandusky. These were the Hurons or Wyandotts of Western Ontario, of Michigan, and of Ohio, descendants of the old Hurons and Petuns of the Georgian Bay. What became of these Western Wyandotts? In 1842 the Wyandotts of Ohio ceded their lands, which were situated in Wyandott County, a few miles south of Sandusky, to the United States, and in the following year purchased



from the Delawares a tract of land in the Indian Territory at the forks of the Missouri and Kansas Rivers. W. E. Connelly says of this migration:

"They brought with them from Ohio a well-organized Methodist Church, a Freemason's Lodge, a civil Government, and a code of written laws which provided for an elective council of chiefs, the punishment of crime, and the maintenance of social and public order."

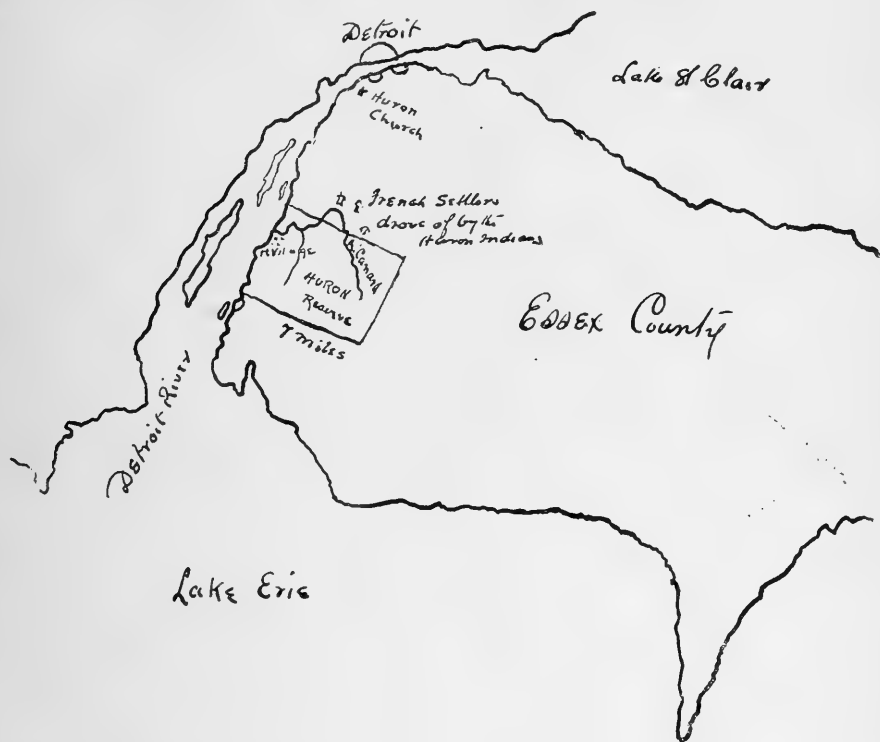
In 1855 their tribal relations were dissolved and the lands were allotted in severalty. A part of the tribe, however, was dissatisfied with this arrangement and moved south, purchasing from the Cowskin Senecas a small tract in the northeastern corner of the Indian Territory, where they resumed tribal relationships and where they now live, having as neighbours a small band of Ottawas on the north and a remnant of their old enemies, the Senecas, on the south.

We have now left for consideration the last remnant of the Hurons or Wyandotts on the Canadian side of the Detroit River. Just one hundred years after the terrible Iroquois had swept the country of the Hurons, Petuns and Neutrals, there was to be found on the east bank of the Detroit a prosperous band of Hurons, descendants of the original Hurons who had come around the lake by way of Mackinac and possibly containing also remnants of the Petuns and of the Neutrals. There were also on the same side of the River Indians of other tribes, Ottawas, Chippewas and Pottawatamies; but the Hurons appear to have been of chief importance, with the Ottawas, their old neighbours and associates, next in order of importance. In 1728 the Catholic Church of Detroit established its first mission among the Hurons across the river, a plain log building was erected two miles below Detroit on the opposite side of the river, and in it services were begun. This was the Huron Church about which there gradually grew up a little settlement, later a village. This village is to-day the town of Sandwich, and the visitor to that oldest town in southwestern Ontario can still see in a fair state of preservation the old wooden Huron Mission, erected between the years 1747-1750, the oldest building now standing in the Province of Ontario.

At the close of the war of American Independence, the chiefs of the Hurons and Ottawas desired to express appreciation of their leaders in the late war and so, in 1784, they gave a tract of land seven miles square at the mouth of the Detroit River (the present Township of Malden, Essex County) to Alexander McKee, Wm. Caldwell, Charles McCormack, Robin Eurphlect, Anthony St. Martin, Mathew Elliott, Henry Bird, Thomas McKeen and Simon Girty. This grant was not fully recognized by the British Governor, but it proved that the Hurons claimed the east bank of the river and fought on the British side during the war. Later, in 1790, the land from the Detroit River east to Catfish Creek was ceded to the Crown by the Indians and the Hurons were among the contracting parties. But in this cession there was reserved a tract of about thirty-six square miles on the Detroit River north of Amherstburg, and also a small tract at the Huron Church opposite Detroit. The former was known as the Huron Reserve, and upon it was the Wyandotte Burial Ground that has been in use for the burial of

Huron Indians down to the present time. In 1833 this reserve was surrendered in trust to the Dominion Government and it has been sold bit by bit for the benefit of the surviving members of the tribe.

And what has become of these Hurons? They have been absorbed into the mixture of races living along the Detroit. A few, a very few, may be found whose blood is fairly pure. Here and there you will find



A. Isdell
Disty Surveyor
W District

Detroit Feb 20 1796

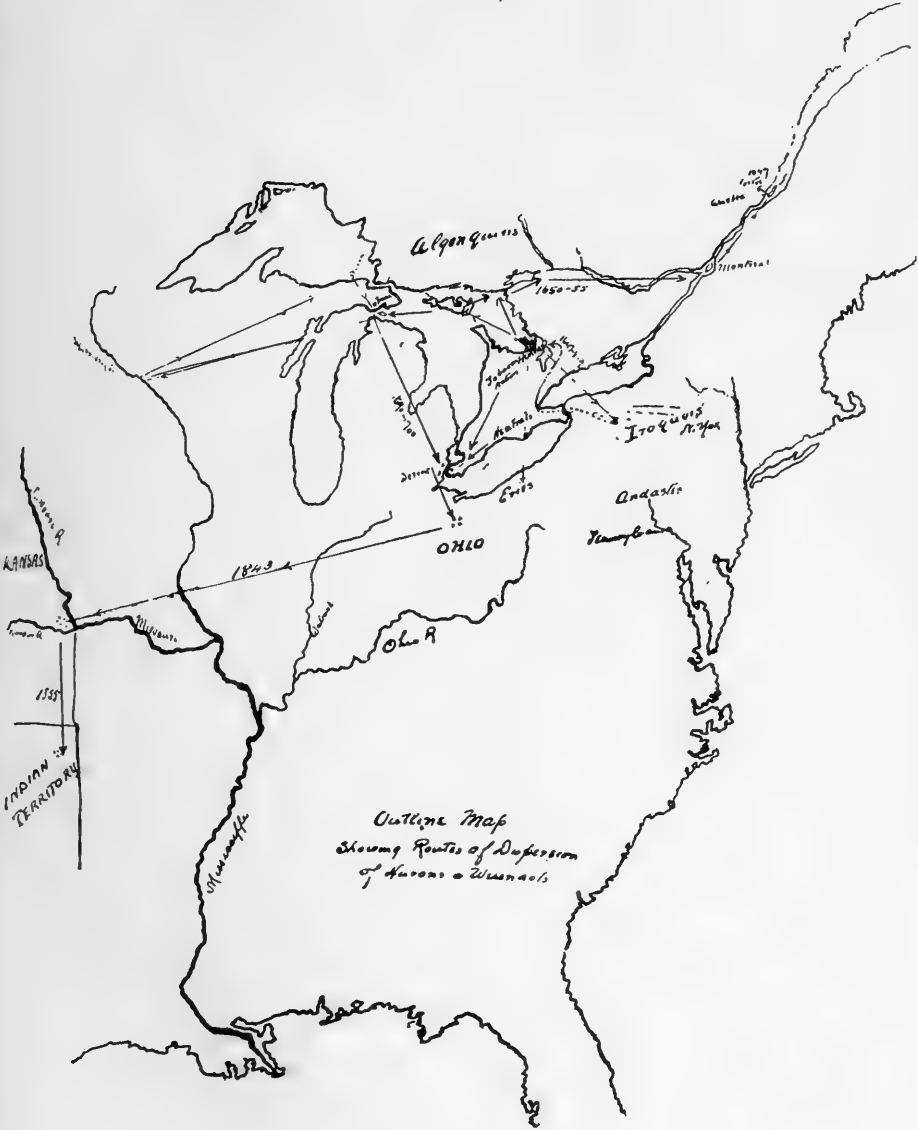
a family bearing an English or a French name but having the lineaments of the Indian more or less distinctly portrayed and who refer with pride to their descent from the ancient Hurons or Wyandotts. Tribal relations ceased in 1880 and 1881 when forty-one heads of families received enfranchisement. The last Indian chiefs of the band were Joseph White and Alexander Clarke. It is worth mentioning that Mr.

Solomon White for some years a member of the Legislature of Ontario is a son of Chief Joseph White. In this connection it may be mentioned that Mr. William Walker, who was the first Governor of the Provisional Territory of Nebraska in 1853, was a Wyandott from the Detroit River.

If time permitted we could make an extensive study of the work done by archæologists in identifying the sites of the old Huron villages. French Canadians interested in the history of the Jesuits have traversed the fields and wooded hills of Simcoe County with the Jesuit Relations in their hands locating here a village, there an ossuary. Archæologists of Ontario have with pick and shovel dug up hatchets and arrow heads, pipes, bowls, large shells from the Gulf of Mexico and the wampum made therefrom, and, to-day, thanks to the labours of Dr. Taché, Father Martin, Mr. David Boyle of Toronto, Mr. A. F. Hunter of Barrie, Mr. J. H. Hammond of Orillia, and many others, we are able to reproduce the map of old Huronia with no little degree of accuracy. We must acknowledge our great indebtedness to the papers scattered through the Ontario Archæological Reports, and to the painstaking researches of Rev. Father Jones, Archivist of St. Mary's College, Montreal, who has in his keeping many of the original records of the Jesuit Missionaries, and who has in preparation a work on the identification of the sites of villages and missions in old Huronia.

My story, condensed and but imperfectly related, has been told. Two hundred and fifty years and more ago, a strong haughty nation was entrenched upon the shores of Georgian Bay. To-day one remnant lives far east, near neighbours to the French Canadians of old Quebec; another remnant lives a thousand miles away to the south, beyond the Mississippi and Missouri; and traces may be discovered along the banks of the Detroit River. Some of the descendants of their old enemies and destroyers have shared with them their lands in the Indian Territory, while others till the fields and raise their crops of corn along the Grand River and in the Bay of Quinte.

The story that I have tried to tell you forms part of the greater history of the struggle of the people of Europe for the control of the trade of this Continent and the ownership of the land. It forms a part also of the story of the early efforts to convert the savages of this Continent to Christianity. Apart from these two relationships it is a story that in itself is full of interest, a story that should appeal to our Canadian singers, a story that should be known to very one who calls himself Canadian.





REMNANTS OF WALLS OF FORT ST. MARY ON THE WYE IN 1891. (Photo. by Dr. W. H. Ellis, Toronto).



REMNANTS OF WALLS OF FORT ST. MARY ON CHRISTIAN ISLAND IN 1891. (Photo. by Dr. W. H. Ellis, Toronto).

APPENDIX

ORIGIN OF NAME "HURON."

"Champlain appelle les Hurons *Ochastequins*, et les confond avec les Iroquois, qu'il a cru sans doute ne faire avec eux qu'une même nation, à cause de la conformité qu'il avait remarquée entre les langages des uns et des autres. Peut-être aussi les avait-il ouï nommer Ochastequins par quelques autres Sauvages. Mais leur véritable nom est YENDATS. Celui de Hurons est de la façon des François, qui voyant ces Barbares avec des cheveux coupés, fort courts, et relevés d'une manière bizarre, et qui leur donnoient un air affreux, s'écrièrent la première fois qu'ils les apperçurent: *Quelles Hures!* et s'accoutumèrent à les appeller Hurons."

Histoire et Description Générale de la Nouvelle France, by Father de Charlevoix, 1744, Vol. I, p. 285.

FORT STE. MARIE I.

The following description of Fort Ste. Marie on the Wye by Father Martin is taken from the autobiography of Father Chaumonot, published in Paris in 1885. Father Martin's examination of the ruins was made in 1859. "Nous trouvâmes sans peine les ruines du fort Sainte-Marie. Ses murailles, en bonne maçonnerie, s'élèvent encore à plus d'un mètre au-dessus du sol. Il a la forme d'un parallélogramme allongé, avec des bastions à ses angles. Malgré quelques singularités dans sa construction, dont il est difficile aujourd'hui de donner les motifs, on reconnaît sans peine dans ce travail des notions d'art militaire, appliqués avec soin. Les courtines de l'ouest et du nord sont entières, tandis qu'il ne reste aucune trace de celles de l'est et du sud. Il est à présumer qu'elles étaient formées par de solides palissades que le feu et le temps ont fait disparaître. De ces deux côtés, l'ennemi était moins à craindre. A l'est et au sud, on voit encore les traces d'un fossé assez profond, qui protégeait l'enceinte. Celui du sud se prolonge jusqu'à la rivière, et il est évident qu'il devait être capable d'en recevoir les eaux, et permettre aux canots sauvages d'y trouver un abri. Il s'élargit en trois endroits, pour former trois petits bassins réguliers très favorables pour aborder. Le long de ce large fossé, s'étend au sud un assez vaste terrain, protégé du côté de la campagne par une espèce de redan, dont on distingue très bien encore le parapet en terre et le fossé qui communique avec la rivière. C'est là que se dressaient les tentes des sauvages visiteurs, et les grandes cabanes, qui formaient l'hôpital et l'hôtellerie.

A côté du bastion du fort, au sud-ouest, il y a une construction carrée qui a un mur très épais. Elle devait sans doute servir de base à une tour élevée, d'où l'on pouvait avoir vue au loin, et surveiller facilement les approches." Autobiographie du R. P. Chaumonot de la Compagnie de Jésus et son complément, par le R. P. F. Martin, Paris, (H. Oudin), 1885, pp. 268-270.

(Copy.)

THE HURON RESERVE ON THE DETROIT RIVER.

Ottawa, 1st May, 1906.

My Dear Sir:—

Referring to your letter, undated, asking for information relative to the Wyandotte Indians, I have to say that from the records it would appear that the Huron Reserve, in the Township of Anderdon, seven miles square and

fronting on the Detroit River, formed part of the ancient possessions of the Wyandottes and was confirmed to them at the general partition of lands by the different tribes in the year 1791. In 1833 the reserve was surrendered in trust to the Government in order that a portion of it might be sold for their benefit. In 1836 two-thirds of the reserve was again ceded on the following conditions:—

Block A, containing 7,550 acres, to be sold for the benefit of the Tribe; Block C, containing 7,070 acres, for the benefit of Indians generally; Block B, containing 7,770 acres, was retained for a reserve for the Wyandotte Band.

The following surrenders were subsequently made of this reserve:—

20th Sept., 1836. Part of Anderdon Township, Essex County.

19th July, 1853. Part of W. Sandwich Township, Essex County.

28th April, 1854. Part of Town of Sarnia and part of West Sandwich, Essex County (60¾ acres).

27th Feb., 1863. Fighting Island, Detroit River.

20th Aug., 1875. Lots 6, 7, 8, 9 and south ½ of 10, in Con. 6, 7 and 8, Anderdon Township, Essex County.

21st Dec., 1877. Southerly 2-3 of Lot 13, Con. 1, and south ½ of Lot 8, Con. 3, for Solomon White; south ½ of south ½ of Lot 7, Con. 3, for Mary L. White; Indian marsh, for Chief Joseph White; Anderdon Township, Essex County.

7th May, 1879. Water lot in front of southerly 2-3 of Lot 13, Con. 1., Anderdon Township, Essex County, for Solomon White.

7th May, 1879. South-east quarter of Lot 6, Con. 3, for Victoria Maguire; south-west ¼ of Lot 9, Con. 4, for Christine Ramon; north-west ¼ of Lot 8, Con. 2, for Catherine Bernard; south-west ¼ of Lot 6, Con. 3, for Charlotte Marsh, Anderdon Township, Essex County.

27th April, 1880. Water lot in front of Lot 18, Con. 1, Anderdon Township, Essex County.

25th April, 1882. Gore in rear of south ½ of Lot 19, Con. 1, Anderdon Township, Essex County. (6 27-100 acres.) For Lewis Warrow.

16th Dec., 1886. North ½ of south ½ of Lot 7, Con. 3, Anderdon Township, Essex County.

26th June, 1889. Gore in rear of Lot 17, Con. 1, Anderdon Township, Essex County.

In the year 1876 application was made by the Band to be enfranchised under the terms of the Indian Act. The application was approved and the probationary term having been served the Indians were granted enfranchisement in the years 1880 and 1881, in all 41 heads of families received enfranchisement.

The only remaining unenfranchised member of the Band is Mrs. Catherine Maiville, née Laforet. This woman who is now 85 years of age, was married to Peter Maiville, a white man, in 1846, whose death occurred in 1852. The last Indian Chiefs of the Wyandotte Band were Joseph White and Alexander Clarke.

Yours truly,

(Signed) FRANK PEDLEY,

Deputy Superintendent General of Indian Affairs.

SOME WORKS OF REFERENCE ON THE HURONS AND THEIR DESTRUCTION BY THE IROQUOIS.

Jesuit Relations (edition published by The Burrows Brothers Company, of Cleveland, Ohio). The letters and journals of the Jesuit Fathers are to be found in nearly every one of volumes VII to XLVI inclusive, covering the years 1634 to 1661.

Sagard. *Le Grand Voyage du Pays des Hurons*, par Fr. Gabriel Sagard, Recollet de St. Francois. This was first published at Paris in 1632. In 1865 a new edition was issued at Paris by Librairie Tross in two volumes. As the date indicates, this description was written just prior to the time of the Jesuit mission.

Bressani. Relation Abrégée de Quelques Missions des Pères de la Compagnie de Jésus dans la Nouvelle-France, par le R. P. F. J. Bressani, de la même Compagnie. Traduit de l'Italien et augmenté d'un avant-propos, de la biographie de l'auteur, et d'un grand nombre de notes et de gravures, par le R. P. F. Martin, de la même Compagnie. Montréal (John Lovell), 1852. The original was published in 1653. The appendices, by Father Martin, are very valuable in connection with the study of this question.

Martin. Two books by Rev. Felix Martin, S.J. (in addition to Bressani, referred to above) contain some information as to the Hurons. The first is his "Life of Father Isaac Jogues," which was translated into English by John Gilmary Shea and published in 1885. Appendix A contains notes on the geography of the Huron country, with description of the ruins of St. Mary on the Wye as Father Martin found them. The following work by the same author will be found more complete and the notes on the Jesuit Fort are accompanied by a sketch plan:—*Autobiographie du R. P. Chaumonot, de la Compagnie de Jésus, et son complément, par le R. P. F. Martin, de la même Compagnie.* Paris, 1885. This latter work also contains a plan of Fort St. Mary on Christian Island (p. 272) and of the chapel at Jeune Lorette (p. 218).

The Hurons of the Detroit. The Catholic Home Magazine for 1903 (London, Ont.), contained a paper by the late Miss Margaret Claire Kilroy, of Windsor, entitled "Sandwich, the origin of the Diocese of London." It contains a sketch of the early mission to the Hurons in the Detroit and an illustration of the old mission House still standing at Sandwich. This article is quite exhaustive.

Clarke.—Origin and Traditional History of the Wyandotts, and sketches of other Indian Tribes of North America. True Traditional Stories of Tecumseh and the League in the years 1811 and 1812, Toronto (Hunter, Rose & Co.), 1870. By Peter Dooyentate Clarke.

Connelley. Volume III, second series (1899), of the publications of the Nebraska State Historical Society is entitled: "The Provisional Government of Nebraska Territory and the Journals of William Walker, Provincial Governor of Nebraska Territory." It is edited by William A. Connelley, of Topeka, Kansas, and contains notes of the migration of the Wyandotts from Ohio to the Indian Territory, a map of the Wyandott Purchase and sketch of William Walker, the Wyandott, who was born in Michigan in 1799 or 1800 and died at Kansas City, Mo., in 1874.

Ontario Archeological Reports. Nineteen reports, prepared by Mr. David Boyle, have been issued by the Ontario Department of Education, Toronto. For the years 1886 to 1894 they were issued as reports of the Canadian Institute. Subsequent to the year 1894, when the museum was transferred to the Department of Education, they have been issued directly by the Department. The following references may be of service to students of the Huron-Iroquois feud.

1889. Pages 4-15 refer to the Tobacco Nation, methods of burial, sites of ossuaries, map of Nottawasaga Township, etc. Pages 42-46, paper by Mr. A. F. Hunter, B.A., on "French Relics from Village Sites of the Huron."

1890-91 (Fourth Annual Report of the Canadian Institute). This contains on pages 18 and 19 some notes on Ste. Marie on the Wye and its decadence, with an appeal for its preservation.

1892-3. (The Sixth Annual Report of the Canadian Institute, misprinted "fifth" on title page.)

Pages 22-34 contain an interesting sketch of the Neutrals and their relation to the Hurons, by Mr. James H. Coyne, B.A., under title of "The Southwold Earthwork and the Country of the Neutrals."

1895. The report for this year, the 8th of the series, appeared under the title: "Notes on Primitive Man in Ontario." The articles on "Aborigenes of Ontario," "Social Condition," "Food," "Religion," "Burial Customs," etc., contain many interesting notes on the Hurons.

1897-8. (11th Report.) "The Jesuit Stone," p. 32, is an interesting note of 1641. "Christian Island," pp. 35-42, contains the plan of the old Jesuit Fort (from Ducreux), also notes on the condition of the ruins in 1897. Sanson's map of 1656 is reproduced. It indicates the location of the Hurons, Petuns, Neutrals, Eries and Andastes before the wars of extermination.

1899. (13th.) "Notes on sites of Huron Villages in the Township of Tay (Simcoe County), by A. F. Hunter, M.A. This was the second of a series, the first on village sites in the Township of Tiny, having been printed by the Department of Education, as a separate brochure in the previous year. On pages 59 and 60 are plans of Ste. Mary on the Wye in 1852 and 1876. This volume for 1899 also contains, pp. 92-123, an interesting article on The Wyandotts, by Mr. Wm. E. Connelley, under the following chapters: "Migration legends," "Clan System," "Government," etc. This article is followed by a translation into English of Mr. Benjamin Sulte's history of "The War of the Iroquois," pp. 124-151.

1900. "The Flint Workers: A Forgotten People," by Rev. Dean Harris, is a sketch of the Neutrals and contains much of interest in relationship to the Hurons.

1901. "Notes on Huron Villages in the Township of Medonte, Simcoe County," by A. F. Hunter, M.A.

1902. "Notes on sites of Huron Villages in the Township of Oro, Simcoe County," by A. F. Hunter, M.A. This volume also contains the paper by Rev. A. E. Jones, S.J., on "The Identification of St. Ignace II and Ekarenniondi," pp. 92-136. This paper illustrates the method of work adopted by the archivist of St. Mary's College, Montreal.

1903. "Indian Villages Sites in North and South Orillia," by A. F. Hunter, M.A. "The Standing Rock," by F. Birch.

1904. "Cahiagué," by J. Hugh Hammond. This is followed by some notes on Huron village sites in Orillia Township.

1905. "The Iroquois," by David Boyle, pp. 146-158. This is the very valuable paper referred to in the address as discussing the question of the legendary migrations of the Huron-Iroquois peoples.

ROYAL SOCIETY OF CANADA

TRANSACTIONS

SECTION III.

MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

PAPERS FOR 1906

I.—*Abacus of the Altitude and Azimuth of the Pole Star.*

By E. DEVILLE, LL.D.

(Read May 23rd, 1906.)

The boundaries of sections in the land surveys of the Dominion being north and south or east and west lines, it is essential that surveyors who subdivide townships should ascertain frequently the direction of the astronomical meridian, so that they may know the exact bearings of the lines which they are running. The method prescribed for this determination is the observation of the Pole Star in day light. The Star is readily seen an hour after sunrise or before sunset with the telescope of 1½ in. aperture supplied to the Dominion Land Surveyors, provided it is adjusted to bring the Star approximately in the centre of the field. The direction in azimuth is given from the survey lines or by means of the magnetic needle, after which the telescope is set to the altitude of the Pole Star. Sidereal time is given by a common watch, regulated to gain 3 m. 56 s. per day; its error is ascertained from time to time by meridian transits of the sun or stars. To facilitate matters, astronomical field tables are supplied to surveyors. Among other data the tables give the bearing of the Pole Star for every ten minutes and for townships 0, 20, 40, 60 and 80: the bearing at any other time and for any other township is obtained by interpolation. The distance of the Star above or below the pole is also given for calculating the altitude. Although the interpolation for the bearing and the calculation of the altitude are very simple, some surveyors prefer to have no calculation whatever: this condition is fulfilled by the abacus.

Graphic Representation of Equations.

Before explaining the theory of this abacus, it is necessary to recall a few of the principles of the graphic representation of equations. An exhaustive investigation of the subject has been made by d'Ocagne:¹ what is needed for our purpose may be briefly summed up as follows:

If, in the equation of a curve:

$$(1) \quad f_1(x, y, \alpha_1) = 0$$

successive increments are given to the parameter α_1 , to each of these increments corresponds a different curve: the equation thus defines a system of curves (α_1).

¹ *Traité de Nomographie* by Maurice d'Ocagne, Paris—Gauthier—Villars.

In the same way, the equations :

$$(2) \quad f_2(x, y, \alpha_2) = 0$$

$$(3) \quad f_3(x, y, \alpha_3) = 0$$

define the systems of curves (α_2) and (α_3) . When three of these curves taken respectively in each of the systems intersect in one point, the corresponding values of the variables $\alpha_1, \alpha_2, \alpha_3$, satisfy the equation :

$$F(\alpha_1, \alpha_2, \alpha_3) = 0$$

resulting from the elimination of x and y between the equations (1), (2) and (3). The value of any one of the variables can thus be obtained by means of the other two. For instance, if we wish in Fig. 1 to

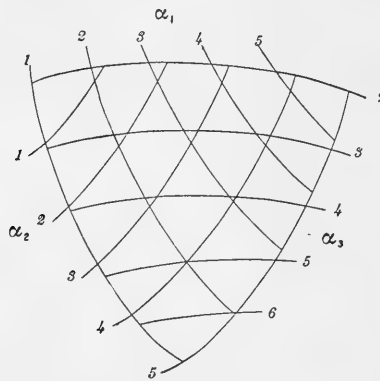


FIG. 1.

find the value of α_3 corresponding to $\alpha_1 = 2$ and $\alpha_2 = 4$, we follow to their intersection the curves marked "2" in the system (α_1) and "4" in the system (α_2) : the curve of the system (α_3) passing through this point being marked "5", this number is the required value of α_3 .

This kind of abacus is the one most frequently met with, although by no means the best. Usually one of the variables, α_1 , is taken as x and another, α_2 , as y ; α_1 is thus represented by a series of parallels to the y axis, α_2 by a series of parallels to the x axis and α_3 by a series of curves. The use of this abacus requires simultaneous interpolation by estimation between three pairs of lines, an operation not susceptible of much precision. The accuracy may to some extent be increased by drawing more lines, but a limit is soon reached beyond which the number of lines becomes confusing.

To shorten writing, let f_n, ϕ_n, ψ_n be written instead of $f_n (\alpha_n), \phi_n (\alpha_n), \psi_n (\alpha_n)$, and let us consider the particular case when equations (1), (2), (3), assume the form :

$$(4) \quad \begin{aligned} x f_1 + y \phi_1 + \psi_1 &= 0 \\ x f_2 + y \phi_2 + \psi_2 &= 0 \\ x f_3 + y \phi_3 + \psi_3 &= 0 \end{aligned}$$

Each of these equations defining a system of straight lines, their resultant after the elimination of x and y :

$$(5) \quad \begin{vmatrix} f_1 & \phi_1 & \psi_1 \\ f_2 & \phi_2 & \psi_2 \\ f_3 & \phi_3 & \psi_3 \end{vmatrix} = 0$$

is represented by three systems of straight lines. Thus an abacus consisting of straight lines only can be constructed whenever the equation to be represented can be put in the form of equation (5).

By the application of the principle of duality, this figure can be transformed into a correlated one such that to straight lines shall correspond points. Each of the equations (4) which, in the first figure,

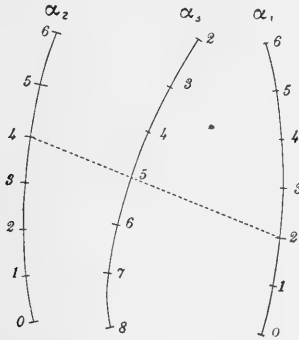


FIG. 2.

defines a system of straight lines tangent to their envelope, defines, in the second figure, points distributed upon a curve, their bearer, as in Fig. 2. Equation (5) which in the first figure means that three straight lines are copunctal, means in the correlated figure that three points are costraight. Instead of following as in Fig. 1 the lines (α_1) and (α_2) to their intersection and finding the line of the system (α_3) which passes through this point, the mode of employment of the new kind of abacus (Fig. 2) consists in joining by a straight line the points (α_1) and (α_2) and reading the graduation at the intersection of the bearer of (α_3) . The abacus has gained in simplicity, consisting only of three lines, and the interpolation by estimation instead of being simultaneous between three pairs of lines is now made three times in succession between two divisions of a graduation, a process susceptible of considerable precision.

A convenient way of effecting the transformation is to employ *parallel* instead of *cartesian* co-ordinates. The parallel co-ordinates u and v of a straight line are the distances AM , BN , (Fig. 3) of its inter-

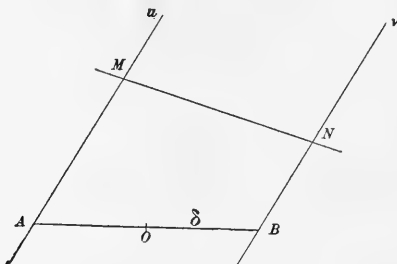


FIG. 3.

sections by two parallel lines from the origins A and B selected on these parallels. In this system, an equation of the first degree:

$$(7) \quad au + bv + c = 0$$

defines a point of which the cartesian co-ordinates may be found as follows: Taking O , centre of AB , as origin, OB as axis of x , a parallel through O to AM and BN as axis of y and designating by δ the distance OB , we have:¹

$$(8) \quad x = \delta \frac{b - a}{b + a}$$

$$(9) \quad y = \frac{-c}{b + a}$$

¹ Equation (7) gives for $u = 0$:

$$v = \frac{-c}{b}$$

and for $v = 0$:

$$u = \frac{-c}{a}$$

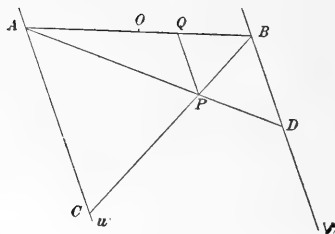


FIG. 4.

Similar triangles give the following proportions:

$$\frac{AQ}{AB} = \frac{QP}{BD}$$

and

$$\frac{BQ}{BA} = \frac{QP}{AC}$$

Abacus of the Azimuth of the Pole Star.

The azimuth of a star in terms of the latitude, hour angle and polar distance, is given by the formula :

$$\tan z = \frac{\tan P \sec L \sin t}{1 - \tan P \tan L \cos t}$$

in which :

z = Azimuth of the star

P = Polar distance of the star

t = Hour angle of the star

L = Latitude.

The azimuth and polar distance of the Pole Star are so small that if the above expression be developed in terms of the powers of z and P , the terms containing powers above the second can, in the case of subdivision surveys, be neglected. Expressing z and P in minutes of arc, we obtain :

$$z \cos L = P \sin t + \frac{P^2}{2} \tan L \sin 2t \sin 1'$$

The surveys of Dominion Lands extend from the 49th parallel of latitude to about township 84, in latitude $56^{\circ}20'$, an interval of $7^{\circ}20'$.

Substituting the values of the different lines, the equations become :

$$\frac{\delta + x}{2 \delta} = \frac{y}{\frac{-c}{b}}$$

$$\frac{\delta - x}{2 \delta} = \frac{y}{\frac{-c}{a}}$$

hence :

$$\delta + x = 2 \delta \frac{b y}{-c}$$

$$\delta - x = 2 \delta \frac{a y}{-c}$$

Adding up and dividing by 2δ , we have :

$$1 = y \left(\frac{b + a}{-c} \right)$$

or

$$y = \frac{-c}{b + a}$$

Subtracting the second equation from the first one gives :

$$2x = 2 \delta y \left(\frac{b - a}{-c} \right)$$

Replacing y by its value and dividing by 2:

$$x = \delta \left(\frac{b - a}{b + a} \right)$$

A mean value of the latitude may therefore be adopted for the last term of the above expression, which is always small.¹ Denoting by L_o this mean value, the equation may be written :

$$\frac{P \sin t + \frac{P^2}{2} \tan L_o \sin 2t \sin 1'}{z} - \cos L = 0$$

now put :

$$(10) \quad P \sin t + \frac{P^2}{2} \tan L_o \sin 2t \sin 1' = \frac{u}{l_1}$$

$$(11) \quad -\cos L = \frac{v}{l_2}$$

and the equation becomes :

$$(12) \quad \frac{u}{z l_1} + \frac{v}{l_2} = 0$$

The value of u is calculated by (10) for hour angle intervals of 10 minutes and laid out on the axis of u , Au , (Fig. 5), but the sidereal time instead of the hour angle is marked opposite the divisions of the graduation. This time is equal to the sum of the hour angle and right ascension of the Star. The modulus l_1 is the length of one minute of arc on

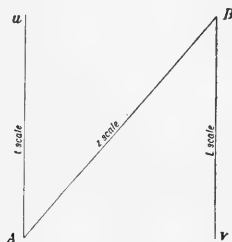


FIG. 5.

Au ; it is selected arbitrarily so as to give suitable proportions to the figure.

In the same way, the values of v or $-\cos L$ are laid out below B on the axis of v , Bv , v being negative. The modulus l_2 is the length of $\cos 0^\circ$; like the modulus l_1 , it is selected so as to give suitable propor-

¹ Designating by L_1 and L_2 the extreme values of L , the value of L_o which causes the least maximum error in the azimuth is given by the expression :

$$\tan L_o = \frac{\tan L_1 \cos L_2 + \tan L_2 \cos L_1}{\cos L_1 + \cos L_2}$$

In the present case $L_o = 53^\circ 17'$. The error is a maximum for townships 0 and 84 and for hour angles of 3 or 9 hours : it is then equal to 0.22.

For values of t between 12^h and 24^h , the graduations of both t and z would fall beyond A and increase the size of the figure: this is avoided by changing the sign of u in (10). We have then two graduations for sidereal time on Au , and two graduations for bearing on AB ; the second graduations are printed in red to distinguish them. Plate I shows a specimen of the abacus.

Abacus of the Altitude of the Pole Star.

The altitude, h , of a star in terms of the latitude, hour angle and polar distance is given by the formula:

$$\sin h = \sin L \cos P + \cos L \sin P \cos t$$

Let:

$$h = L + x$$

then:

$$\sin L \cos x + \cos L \sin x = \sin L \cos P + \cos L \sin P \cos t$$

P and x are very small. Developing this expression in terms of the powers of P and x , and discarding the terms which contain powers above the second, we find:

$$x = P \cos t - \frac{P^2}{2} \tan L \sin^2 t$$

As before, we adopt a mean value, L_o , for $\tan L$.¹ Allowing $0'.75$ for refraction, we may write:

$$H = h + 0'.75$$

Expressing H , L , and P in minutes, we have:

$$L + P \cos t - \frac{P^2}{2} \tan L_o \sin^2 t \sin 1' - H + 0'.75 = 0$$

Putting:

$$(14) \quad \frac{u}{l_1} = L$$

$$(15) \quad \frac{v}{l_2} = P \cos t - \frac{P^2}{2} \tan L_o \sin^2 t \sin 1'$$

the equation becomes:

$$(16) \quad \frac{u}{l_1} + \frac{v}{l_2} - H + 0'.75 = 0$$

The scale of u , (14), is a regular scale of modulus l_1 , properly selected, for one minute of latitude. It is laid out on Au , but instead of measuring multiples of l_1 , and numbering them in minutes of latitude,

¹ The mean value causing the least maximum error in the altitude is the mean of the extreme values of $\tan L$; it corresponds to $L_o = 52^\circ 59'$. The maximum error for $t = 6^h$ or 18^h and for township 0 or 84 is $0'.175$.

we measure multiples of $n l_1$, n being the number of minutes of latitude in a township, and mark the township number opposite the divisions of the graduation. The scale of v , given by (15), is also a regular scale laid out on Bv with an appropriate modulus l_2 ; instead of the hour angle, the sidereal time is marked opposite the divisions of the graduation.

The cartesian co-ordinates of the points of the H scale, defined by (16), are given by (8) and (9):

$$x = \delta \frac{l_1 - l_2}{l_1 + l_2}$$

$$y = (H - 0.75) \frac{l_1 l_2}{l_1 + l_2}$$

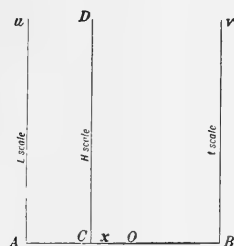
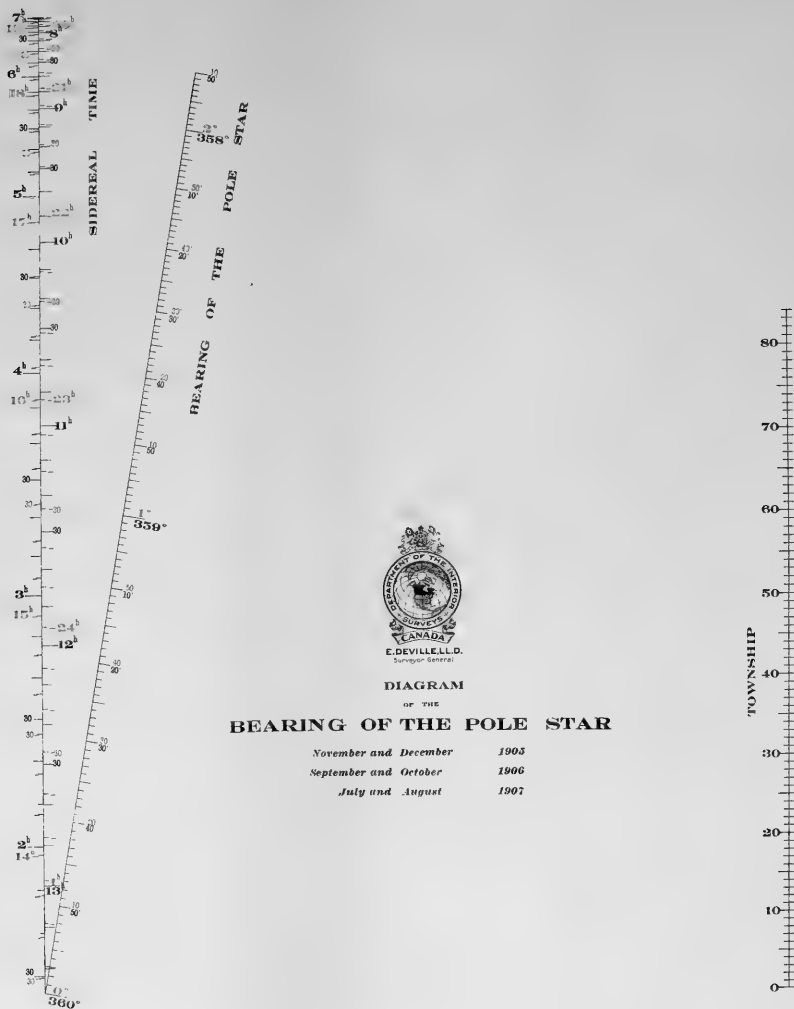


FIG. 7.

x being a constant, the bearer of the H scale is a parallel CD (Fig. 7) to the axes, drawn at a distance x from the centre of AB . The H scale is a regular scale of modulus $\frac{1}{l_1} + \frac{1}{l_2}$, commencing at 0.75 below the line AB .

The abacus has been made in two parts placed one over the other. The sidereal time scale is identical in both. The divisions of the altitude and township scales have been so arranged that they coincide, but they bear different numbers. The numbers of the second part are printed in red.

Plate II shows a specimen of the abacus.



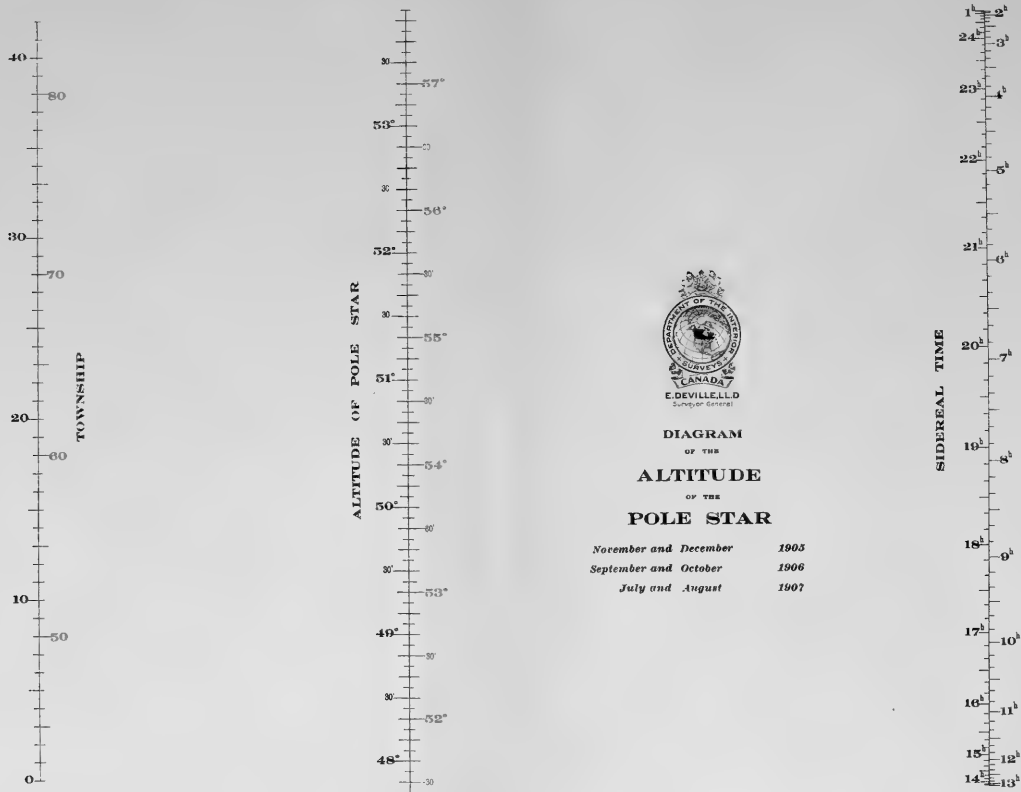


DIAGRAM
OF THE
ALTITUDE
OF THE
POLE STAR

<i>November and December</i>	<i>1905</i>
<i>September and October</i>	<i>1906</i>
<i>July and August</i>	<i>1907</i>

II.—*A Subjective Phenomenon of Vision.*

By W. RUPERT TURNBULL, M.E., ROTHESAY, N.B.

(Presented by Dr. G. U. Hay.)

1. I wish to describe in this paper a rather remarkable phenomenon of vision which, as far as I can learn has never before been made public (see Historical Review at the end of paper).

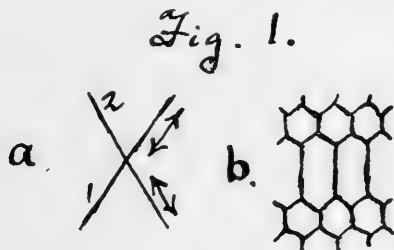
2. The investigation has extended somewhat over a year. The experiments at first were of a desultory character and it is only within the latter part of the year that the subject in hand could receive due attention.

It is with some hesitation that this paper is now presented for it is in many ways crude and unfinished, but the importance of the phenomenon seems so great that the publication of even incomplete results seems desirable. More especially as I am about entering on a most thorough investigation (see supplement, written June, 1904) and hope not only to profit by the criticisms of the work done and undone, but hope also that this article may be the means of communicating with other persons who have observed the same or a similar phenomenon.

11.

The Phenomenon as first, and as now observed.

3. When a lad of 10 or 12 years, I saw, after retiring at night—the room being dark—an image projected in space, which seemed to oscillate, first in one oblique plane (1), making perhaps an angle of 30° with the vertical, and then, after a confusing break in the oscillations, vibrating in



the opposite oblique plane (2) (see fig. 1. a). After oscillating in the second oblique plane for perhaps a few seconds the image lost what definiteness of contour it had and apparently broke up into bright points resembling myriads of stars. These points seemed to stream before the

eyes and despite all efforts to retain them in the visual field, they invariably disappeared in course of a second or two leaving only the "proper light" of the retina behind.

4. The image which oscillated could hardly be called distinct and yet it seemed to consist of yellowish or whitish lines grouped together, in the centre of the image, in the manner of the lines in b fig. 1, the border of the image was extremely indistinct and blended insensibly into the dark background. On account of the rapidity of the oscillations it was not easy to count the number of hexagons making up the more distinct or central portion of the image or to estimate the angle which the image subtended in the visual field. It is interesting here to note the similarity between this image and illustrations of the crystalline lens cells.¹

6. For perhaps 15 years the phenomenon just described appeared occasionally, after retiring, but no attempt was made to study it. Some thing over a year ago (now April, 1904—9 years ago), however, after repeated efforts to retain the image in the visual field, the writer succeeded, by practice, in observing what is, apparently, a modification of the original image.

7. The more recently observed image seems to be nothing more than a group of indistinct light points—a kind of *nebulous* image—which oscillates as did the first and has an indistinct circular or elliptical border blending insensibly into the background.

8. This image when seen in darkness seems to be something more than the "proper light" of the retina. With most people the "proper light" consists of light points or "light-dust" in a confusing state of motion, but in the writer's eyes the motion of the *nebulous* image can be followed — perhaps only on account of the introductory lessons given by the image as first observed. Every instant or two some points instead of oscillating regularly seem to start from the image, but the *nebulous* image, as a whole, keeps on oscillating regularly so that the vibrations may be counted.

9. Ever since seeing this image the former image has been seen occasionally.

10. The plane of oscillation of the image² seems to be more or less vertical, but it does not remain constant and there seems to be a shifting of the plane to 30 or 40 degrees on either side of the vertical.

¹ Quain. "Elements of Anatomy," 1895, Vol. III, Part III, p. 64, Fig. 75B. This book is heartily recommended to the physicist, interested in this article, who wishes to find a complete and exceedingly good anatomical description of the eye.

² By "the image" will hereafter be always meant the *nebulous* image, which is the usual one at present observed.

11. The image is now, so to speak, "on call"; that is, the writer can at any time of the day or night see this hazy image; and the oscillations, so far as he has observed, never cease.

12. Only, however, when certain conditions are complied with is the image seen when light is entering the eyes; for instance the image may be usually seen when the eyes are "fixed" upon some non-luminous and non-lustrous body, or upon the blue sky, etc.—*i.e.*, when reflected light is entering the eyes. It is usually not seen when a luminous or lustrous body is fixed, although in this case suggestions of bright points are sometimes seen.

13. With opened eyes the image always appears at the point of direct vision and seems to oscillate upon the focussed object. Unless the writer looks for the image it usually remains unnoticed, but it sometimes appears unbidden when dark or shadowed objects are seen.

14. In complete darkness the image seems to be projected in the centre of the visual field or, rather, what would be the fixation point.

15. The oscillations can generally be counted and with more or less accuracy according as the image is more or less distinct. It must be borne in mind that the more carefully and continuously such phenomena as this are studied, the more one is able to see distinctly and recall subjective images once seen, and it is only by long practice that the best results are obtained.

Apparatus and Methods of Observation.

16. In order to obtain the periodicity of the oscillations, a stop watch, reading to tenths of a second, was at first employed and a chronograph reading to hundredths of a second was used in the latter part of the experiments.

17. It was found that the ticking of the watch or any other sound having a distinct *tempo* was very distracting, when counting the oscillations, so the watch was set up in a room other than that in which the observations were made.

18. The watch was operated by an electro-magnetic gravity drop and the readings were taken by an assistant. The electro-magnet was operated by a key, at the observer's right hand, which broke a battery circuit, when pressed, allowing an iron rod pivoted at one end to fall on a lever operating the spring stop of the watch. The rod was at once replaced by the assistant, the current having been broken but an instant. The sources of error of this instrument were the inertia of the watch's balance wheel and the variable residual magnetism of the electro-

magnet. The probable error of a single reading was found to be about ± 0.06 secs., due to the above mentioned sources of error combined.

19. The chronograph employed in the latest experiments although of rude construction, had a smaller probable error than the stop watch (viz: ± 0.026 secs. for a single reading) and had the great advantage over the stop watch of enabling observations to be made continuously, without the necessity of waiting for an assistant to make each reading. The chronograph consisted of a drum driven by a falling weight and kept at nearly constant speed by clockwork over this drum (which was covered with sand-paper) a long ribbon of paper (registering telegraph paper) was made to pass by the rotation of the drum. In order to keep the paper taut and to bring about the required friction between drum and paper, the ribbon was made to pass between the felt covered jaws of a spring clamp and a suitable weight was attached to the end of the paper and descended, beside the driving weight, a distance of some 9 or 10 metres. The cord of the driving weight passed but once over the drum and was held taut and prevented from slipping by a small counter weight and the sand-paper; by this arrangement errors due to inequalities of the diameter of the drum were avoided. A pencil mounted above the paper where it was in contact with the drum and operated by an electro-magnet and key (placed at the observer's hand) completed the apparatus.

20. Besides the probable error, as given above, this chronograph was subject to another error, due, probably, to variable friction of the clockwork. The speed would very gradually increase or decrease and since the amount was not calculable, as many readings were taken at a time as possible and, where preliminary runs were not taken, and runs were begun in the middle of a series, the results for all colours had to be discarded in that series.

21. The accidental errors, both with the stop watch and chronograph, have been eliminated as far as possible, by large numbers of readings.

22. The apparatus employed to ascertain the effect of simple and mixed coloured lights was a modification of Lambert's apparatus for mixing pigment colours.¹ Instead of pigments coloured glass plates were used and placed over two square holes (cut in either end of a box). An "Auer" gaslight was placed in the middle of the box inside and reflectors of white magnesium oxide (coating upon glass) placed inside the box

¹ Encyc. Britt., 9th Ed., Vol. VIII, p. 823.

and at the ends of it reflected the light from the burner through the holes. A piece of plate glass was mounted vertically a little above the middle of the box outside. A certain amount of light, from each hole was thus permitted to enter the eye in the same direction, a part of the light from one hole being transmitted through the glass plate and a part of the light from the other hole being reflected by it. The intensity of the light passing through the respective holes was varied by turning the reflectors about a horizontal axis, the angles through which they were turned being read on graduated arcs placed at each end of the box outside.

RESULTS OF OBSERVATIONS.

The retinal size of image and the amplitude of oscillations.

23. Although the border of the image is not sharply defined, still, fairly accurate measurements of the retinal size of the image and rather unsatisfactory estimations of the amplitude of vibration, have been obtained.

24. Pieces of white paper were used, upon which circles of 5, 10, 15, 20 and 25 mm., respectively, were drawn with black ink. Placing these pieces of paper in succession before my eyes I retreated or advanced, with eyes fixed upon the centre of the circle, until the image appeared to completely fill the circle; then the distance from the eyes to the paper was measured—these experiments were carried on in a brightly lighted room with the observer's back turned towards the light.

25. A calculation of the retinal size of the image (from these data)

is simple, from the proportion:— $\frac{f}{F} = \frac{d}{D}$; when f is the distance of

the eyes from the background; F the distance of the second nodal point of the crystalline lens from the retina (this is, as an average, 15 mm.), d the diameter of the image upon the background, and D the corresponding diameter upon the retina. An average of the observations taken (5 sets of 5 readings each) gave as the value for D , the retinal diameter of the image .0183 mm., when light is entering the eyes.

26. The diameter, as given by Kölliker, of the Fovea centralis of the retina is from 0.18 mm. to .225 mm. As the image is invariably seen at the point of direct vision, and as the above value (.183 mm.) falls within the measurements of Kölliker, the image undoubtedly is seen only by the rods and cones of the Fovea centralis (this when light enters the eyes).

27. That more of the image is seen when no light enters the eyes is shown by the following experiment:

28. Upon three plates of sooted glass circles of 20, 40 and 60 mm., respectively, were traced. These were placed vertically, in succession, on a sliding carriage, between a fishtail burner and the eyes, both burner and glass being perpendicular to the line of sight. The centre of the circular disc was "fixed" with the eyes for, perhaps, a quarter of a minute or more, then the eyes were closed and all light excluded and a negative after-image was seen. By trial, that position of the carriage was then found by which the vibrating image completely filled the circular disc of the negative after-image, without, however, extending beyond the limits of the disc.

29. The results of these observations gave, as the retinal diameter of the image when no light enters the eye, about 0.47 mm. According to Kölliker the horizontal diameter of the yellow spot (*Macula lutea*) is 3.24 mm., and the vertical diameter of the same 0.81 mm. These measurements show that the image is seen well within the boundaries of the yellow spot and, even in darkness, does not extend far beyond the limits of the Fovea.

30. In both of the foregoing experiments an attempt was made to estimate the amplitude of the vibrations, this is, however, an exceedingly difficult thing to do. In the first experiments two faint pencil marks were drawn on the paper on either side of the centre to aid in estimation, but in the second experiments no such expedient could be adopted. The average results of these estimations are not to be relied upon as being anything but crude; at the same time they are probably not far from the truth.

31. I find that the amplitude when light is entering the eye is about one-tenth of the diameter of the image (*i.e.*, about 0.018 mm.); and that the amplitude when light is not entering the eye (*i.e.*, in the after-image) is, perhaps,¹ one-twentieth of the diameter of the image (or, about 0.023 mm.).

32. What either the diameter of the image or its amplitude may be in absolute darkness and with no after-image, it is hard to say, but I do not think that the image becomes any larger than in the after-image, or that the amplitude alters appreciably.

33. Attempts to measure the amplitude by means of a background vibrating with a simple harmonic motion, proved quite fruitless, although the method has not yet been abandoned and may yet be productive of accurate results regarding both the amplitude and the nature of the vibrations.

¹ I say, "perhaps," because this value may be very inaccurate; the amplitude, in the case of the after-image, especially, being difficult to estimate.

The image does not, I think, follow a simple harmonic motion, and herein probably lies the failure with the above apparatus.

The Periodicity of the Vibrations and the Conditions Affecting it.

34. For the most part the experiments have been confined to the periodicity and the conditions affecting it. So far as the experiments have now gone the periodicity is *probably* affected:—by the wave length of homogeneous light impinging on the Fovea; and by mixed light falling on the Fovea; and *more certainly*, by the intensity of the light; the act of “fixing” the background; and by the condition and relative fatigue of the eyes and body (see Supplement, June, 1904).

35. These factors and their relative importance may be studied from the curves presented with this paper, and from the tabulated results first given. The method of taking observations was as follows:—(1) *with the stop-watch*, as a rule, the key, breaking the circuit was pressed at the beginning and end of 10 counted oscillations (by one oscillation throughout is meant a complete to and fro motion) a pause was then made allowing the assistant to read the watch and replace the drop; another 10 oscillations were then counted, another pause made, and so on. (2) *With the chronograph*, the key was first pressed when the eyes were “fixed,” a second time when beginning to count, a third time at the end of 5 oscillations, a fourth time at the end of 10, a fifth at the end of 15, and so on, no pauses being made during the run.

36. Although little can be learned from the desultory experiments, made between January 5th and July 15th, 1895, the general results of these were as follows:—Periodicity, apparently,¹ unaffected by counting with one eye open and one shut, no matter which eye was open; also unaffected by bodily exercise, but affected undoubtedly (made somewhat greater) by continued use of eyes.

37. The next observations (made from July 15th to September 1st, 1895) are, perhaps, a little more valuable, although poor methods were used and not sufficient rest was taken between the readings to

¹ I say “apparently,” because not enough readings were taken to establish a result.

permit of the latter readings being uninfluenced by those going before. The results are tabulated below:—

Remarks.	No. of obs. in Sets.	No. of Sets.	Ave. Period. Secs.	¹ Colour.	Further Remarks.
Before opening eyes in the morning.	2	14	.642 .652	— —	Room moderately dark, obs. taken just after awakening.
Looking through coloured glasses at an object in light shadow.	4	7	.504 .512 .591 .513	R G I B none	(This is a poor method for getting the periodicities corresponding to different colours, for, as will be noticed from the results, the readings being taken in quick succession after one another, make all but the first one, too slow.
do.	4	5	.490 .530 .564 .546	I B G R none	

38. It will be noticed in the above experiments with coloured glasses that the periodicity for G is slower when G follows I B than when it follows R; and that when I B comes last, the periodicity for it is only a trifle, whereas when R comes last it is considerably smaller than the periodicity for R. Thus it is seen that exposure to one kind of light, and "fixing" the eyes, makes the oscillations not only slower for that light but for other light also, to which the eyes are exposed immediately afterwards (although there are *relative* changes after exposure).

39. An attempt was made at this time with Nörremberg's apparatus to ascertain the effect of polarised light upon the periodicity or plane of the oscillations; but the lustre of the reflecting mirror made it impossible to see the image.

40. Several sets of readings with coloured glasses were taken at this time with lights of two intensities (approximately reproducible), but, as a black object was always "fixed" in order to make the image more distinct, all the results exhibit periodicities for very low intensities; in each case, however, where the question of fatigue does not enter, the periodicities for I B were somewhat smaller than the periodicities for R, although with very low intensities the differences in periodicity are not so marked as with moderate intensities.

41. A summary of these results is given in the following table; (1) represents a light of *very* low intensity, the flame used was about

¹In the figures and text the following contractions are used: R, red; O, orange; Y, yellow; GY, greenish yellow; G, green; GB, greenish blue; CB, cyanic blue; IB, indigo blue; W, white; B'l'k, black; and "none" means that no glass was held before the eyes.

one candle power and, after reflection from the "black" object and absorption in the glass plates, hardly any light could have reached the Fovea; (2) represents the intensity of the light from an ordinary fish-tail burner after reflection and absorption as before:

Remarks.	No. of Readings in each Set.	No. of Sets.	Colour and Intensity	Ave. Periodicity.	Further Remarks.
Coloured glasses used; short rest after every 2 readings.	2	6	R ₁	.482 .510	The intensity (1) represents the periodicity (almost) for the sensation of black in the case of all of the colours used (as explained in the text above); and therefore no conclusions regarding the change in periodicity brought about by change in intensity can be drawn.
	2	6	R ₂	.493 .528	
	2	6	G ₁	.502 .528	
	2	6	G ₂	.520 .548	
	2	6	IB ₁	.508 .532	
	2	6	IB ₂	.512 .522	
do. readings taken at another time.	2	6	IB ₁	.464 .476	Do.—More accurate results with 3 different intensities follows in the latter part of the experimental work.
	2	6	IB ₂	.470 .488	
	2	6	G ₁	.480 .528	
	2	6	G ₂	.498 .526	
	2	6	R ₁	.504 .544	
	2	6	R ₂	.526 .566	
do.	2	6	R ₂	.490 .530	do.
	2	6	R ₂	.518 .544	
	2	6	G ₂	.504 .534	
	2	6	G ₁	.506 .532	
	2	6	IB ₂	.488 .498	
	2	6	IB ₁	.500 .524	
do.	2	6	IB ₂	.476 .498	do.
	2	6	IB ₁	.502 .512	
	2	6	G ₂	.506 .530	
	2	6	G ₁	.522 .524	
	2	6	R ₂	.548 .560	
	2	6	R ₁	.558 .560	

42. Other sets, taken at this time, clearly indicate that when the eyes are simply exposed to coloured light (readings being taken at the beginning and end of one minute exposures) the periodicity does not increase nearly so rapidly as when an object is "fixed" through the coloured glasses and observations are taken in quick succession. In such case, as before, where the readings were uninfluenced by readings with other glasses, the oscillations were quicker for IB than they were for R.

43. The numerical data for the sets just referred to are as follows:—

Remarks.	No. of obs. in a Set.	No. of Sets.	Colour.	Ave. Periodicity.	b=beginning. e=end.
Coloured glasses before eyes for one minute, readings at the beginning and end of the min.	2	7	R	.481 .486	b e
	2	7	G	.480 .506	b e
	2	7	IB	.469 .520	b e
	2	4	IB	.470 .481	b e
	2	4	G	.500 .522	b e
	2	4	R	.542 .560	b e
Coloured glasses before eyes, readings taken in rapid succession.	4	4	R	.487 .537 .545 .565	The 4 readings taken in about 40 seconds.
	4	4	G	.502 .532 .555 .575	
	4	4	IB	.492 .542 .545 .552	
	4	7	IB	.479 .501 .511 .534	do.
	4	7	G	.496 .521 .543 .561	do.
	4	7	R	.513 .540 .550 .577	do.
	4	7	IB	.479 .501 .511 .534	do.
	4	7	G	.496 .521 .543 .561	do.
	4	7	R	.513 .540 .550 .577	do.

44. In all of the foregoing experiments no idea can be gained of the periodicity corresponding to G, for undoubtedly the "fixing" of the eyes for other colours makes the oscillations slower (when the plates are used in quick succession) for the observations that follow, and in

no case did G commence a set,—however, in the experiments, the results of which follow, considerable rests were always taken between exposure of eyes to differently coloured light, so that all colours were treated alike.

45. It may be further mentioned here that the periodicity for all colours is usually a trifle greater at the end than at the beginning of the day; but in all cases the difference is exceedingly small, and the oscillations are, under like conditions, remarkable for their constancy.

46. To ascertain the periodicities obtaining during the “contest of colours”¹ an I B glass and an R glass was held before the eyes with a perpendicular partition between them touching the nose. An object in the distance was “fixed” and as the field alternated from R to I B, and from I B to R, the oscillations were counted for one colour alone, as it confused the assistant to record both changes and periodicities. For example, during one set each time the field became red 5 oscillations were counted, and in the next set each time the field became indigo 5 oscillations were counted; the glasses for successive sets were changed about for the two eyes; the data are given in the following table:—

Remarks.	No. of readings each alt.	No. of Sets.	Ave. Periodicity.	Average of ave. Period.
I B light in lt. eye and R light in rt. eye. Counted for R sensation.	6	4	.525 .530 .505 .535 .530 .560	.531
do. Counted for I B sensation.	6	4	.470 .485 .470 .505 .510 .520	.493
I B light in right eye and R light in lt. eye. Counted for R sensation.	6	4	.485 .515 .520 .510 .535 .565	.522
do. Counted for I B sensation.	6	4	.460 .460 .470 .505 .510 .505	.485

¹ See Helmholtz “Physiologische Optik,” etc.

47. From foregoing results average of all periodicities for R sensation equal .526, and for I B sensation equal .489. It will be noted in the above table that the oscillations for both sensations are quicker when I B light is in the right eye and R light in the left eye, than when the glasses are reversed for the two eyes, but whether there is a real difference in periodicity for the two eyes, or whether this difference is purely accidental is a matter not yet decided, although the writer hopes in the near future to settle the question.

48. Some experiments made about this time to determine the influence on the periodicity of the heart-beat and body temperature, met with negative results.

49. The results of some experiments to ascertain the relative periodicities for colours and their complementary after-images are given in the following table—the coloured plate (used with the Lambert apparatus par. 22) was “fixed” for a short time and then two readings were taken, after these the eyes were closed, light excluded with the hand, and two readings more were taken.

Remarks.	No. of readings in 1 Set	No. of Sets.	Average Periodicity.
R (glass) { G B (after image) {	4	6	{ .533 { .595 { .563 { .622
G B (glass) { R (after image) {	4	5	{ .510 { .530 { .558 { .586
Y (glass) { I B (after image) {	4	5	{ .544 { .580 { .546 { .576
I B (glass) { Y (after image) {	4	5	{ .498 { .525 { .538 { .564

50. It will be noted from the foregoing table that the oscillations for the G B and I B after-images become at first a little quicker than the second readings for the R and Y glasses, respectively, but for the R and Y after-images the oscillations are a little slower than those given by the second readings for the C B and I B glasses, respectively.

51. The rather slow and relatively irregular periodicities read in the case of the “fixed” coloured plates was probably caused by the

plates having been "fixed" for a varying time before readings were made; for instance, with the Y plate it was difficult to obtain a good after-image without long "fixation," whereas the after-image for the R plate continued for a considerable time, after a comparatively short fixation of the plate—hence the periodicity, in this experiment, is slower for Y than for R.

52. The results of the experiments which follow (made from February to April, 1896) are best seen from the curves, Plates I-V. Several new colours besides the ones at first used were employed in these experiments. Of course, with all the glasses used the light was far from homogeneous, and the light transmitted by the O, Y and C B plates, especially, was decidedly mixed; however, the periodicity corresponding to a certain sensation was what was sought and it may be that the results with these glasses is not very misleading, but without doubt homogeneous light of known wave-length would have been much more desirable.

53. In the following sets the Lambert apparatus placed in a darkened room was used.. The transmitted light alone was used for simple colours, the reflected light being shut off by a black screen placed over the hole nearest the observer.

54. Rests, usually of 5 or 10 minutes, were taken between successive sets. The chronograph (paragraphs 19 and 20) was used in all the experiments that follow in place of the stop-watch (except where otherwise stated).

55. The abscissae (on all plates except V) represent seconds from the time of "fixing" the coloured plates (or other "backgrounds") and the ordinates represent periodicities obtained by pressing the key at the end of every 5 oscillations (and dividing the times thus recorded on the paper strip by 5) from the time of beginning the counting. Since the periodicities could not be obtained simultaneously, but had to be deduced from 5 oscillations, the values for periodicities had to be placed half way between the times of starting and finishing the counting. The curves were placed on different sections of the same plate to avoid confusion of overlapping parts.

56. Plate I represents the curves obtained in this manner in single sets of readings, whereas Plates II-IV (inclusive) exhibit curves platted from average results (the number of sets making up the average being usually ten).

57. The upper curve (1) or Plate I represents the periodicities for a run taken in the middle of the night (3.50 a.m., April, '96), after awakening and before opening the eyes, in a darkened room. It will be noted that in this case the curve is smoother and the oscilla-

tions slower than in any of the other cases. Curve (2) was obtained after spending 16 minutes in darkness, in the middle of the day — it does not show so great a periodicity and it is not so smooth as curve (1). The three curves for coloured light are not as smooth as either curve (1) or curve (2), but they all denote more rapid oscillations. The curves were obtained by “fixing” respectively, the red, green and indigo glasses in the daytime and taking observations as already described. The initial periodicity for indigo is the smallest, then comes green, and then red. The curves for I B and G overlap considerably during the remainder of the runs, although the average periodicities of platted points is in the same order as above (viz.: I. B. 566; G. 586; R. 652). These curves are not exactly comparable with one another as they were made on different days. From these three lower curves no conclusions regarding relative periodicity can well be drawn, and they are here presented merely to show the nature of curves taken in this way.

58. These curves show that for all sensations (besides the gradual slowing down of the oscillations) there are somewhat irregular periods of increasing and decreasing periodicity. Undoubtedly, some of these changes, especially those where a single point deviates considerably from a smooth curve, arise from accidental errors in counting, or in pressing the key. Since these accidental errors cannot surely be detected the curves were drawn through all points.

59. In several sets, taken for the purpose, with assistant and stopwatch, these changes in periodicity were found to be synchronous with the apparent darkening and brightening up of the object or coloured glass that was “fixed”; an increase in periodicity corresponding to a darkening and a diminution of periodicity corresponding to a brightening up of the “background.” The phenomenon of the alternate darkening and brightening of an object, “fixed” for some time, is well known.¹

60. The curves, Plates II, III and IV, were obtained in a similar manner to those of Plate I; however, these curves represent the average of 10 sets each, more colours were used, and only three or four readings taken in each set in order to obtain the initial periodicities for different coloured light and, besides, in the first series (Plate II; and Figs. 1 and 2, Plate III) changes were made in the intensity as well as in the colour of the light. •

61. Plate II shows the curves for red, green and blue sensations with three different intensities, viz.: Fig. 1, the intensity of the light

¹ See Helmholtz “*Physiologische Optik*,” 2nd Ed., p. 511. With absolutely steady “fixation” the intensity probably gradually (apparently) decreases; but since it is impossible to absolutely “fix” the eyes for many seconds, the brightening up may correspond to slight changes of fixation point.

reflected from pigments placed in a darkened room and illuminated by an "Auer" burner; Fig. 2, the intensity of the light transmitted through the coloured glasses placed in the Lambert apparatus as in Fig. 3, the intensity of the light from the bright sky (sunshiny days) after transmission through the same coloured glasses. Plate III, Figs. 1 and 2, show curves for additional glasses (and for the white reflector without any glass) used with the Lambert apparatus as in Fig. 2, Plate II.

62. It will be noted that in all these curves the more refrangible rays have the smaller, and the less refrangible, the larger initial periodicities; whereas white has a periodicity lying part way between that for G and that for Y.

It will be also noted that with increasing intensity (within the small limits of these experiments) the periodicity decreases. In all of these curves there is the usual (initial) rapid slowing down of oscillations observable.

63. Readings in the different sets were, as much as possible, mixed, in order to make all of these curves comparable with one another.

64. Fig. 3, Plate III, represents the curves for red and indigo and a mixture of the two (obtained with the Lambert colour mixer). These curves are not comparable with the others of Plates III and IV (as they were obtained a long time afterwards and the chronograph had changed somewhat), but they are comparable with one another as the sets were thoroughly intermixed.

65. It will be noted that the curve for the mixture lies between the curves for the simple colours, but (initially) somewhat nearer the blue—this may be accounted for by the fact that the intensity of a mixture equals *the sum* of the intensities of the simple lights making up the mixture. The shade of this mixture was what is usually called magenta, *i.e.*, the red predominated a little.

66. The curves, Plate IV, form an independent series of results obtained with different coloured glasses and the Lambert apparatus. They are, in general nature the same as curves Fig. 2, Plate II, and Figs. 1 and 2, Plate III, and they were made, as nearly as possible, under the same conditions. The only additional curve in the latter series is N, Fig. 2, Plate IV, which represents the periodicities obtaining when a dark object is "fixed" (the eyes having just emerged from moderate daylight). The idea in obtaining this curve was to find the initial "*normal*" periodicity, *i.e.*, the periodicity of the oscillations which continually obtains during moderate daylight (it is probable that black does not affect the periodicity initially, but allows the oscillations to become gradually slower). It will be noted that the periodicity for "normal" (.453) is near that for white (.447).

67. The relative (initial) periodicities for different colours are best seen from the curves platted on Plate V, in which assumed wave-lengths (obtained by averaging the data of several authors for colour and corresponding wave-lengths) are the abscissae, and initial periodicities of the respective colours, are ordinates. Curve (1) represents the periodicities obtained from Fig. 2, Plate II, and Figs. 1 and 2, Plate III, and curve (2) the periodicities obtained from the curves on Plate IV.

68. These two curves are very similar in form and would almost coincide if all the ordinates of one were increased, or all those of the other were decreased, by a certain constant amount. This non-coincidence is probably due either to variations of the chronograph or to physiological changes, or both combined. (One week elapsed from the end of the first series to the beginning of the second).

69. It should be mentioned here that if the reader wishes to compare results obtained with stop-watch and chronograph, respectively, he should bear in mind that the initial periodicities in the former case are usually larger than in the latter, because, with the stop-watch 10 oscillations were counted, with the chronograph only 5, and as the periodicity rapidly increases during the act of "fixing," this will sufficiently account for any apparent discrepancies — it must also be remembered that physiological changes, also, slightly affect the periodicity.

70. The chief results of the foregoing experiments (pertaining to periodicity) may be briefly summarized as follows:—

Periodicity changes almost *certainly* with intensity of impinging light, the act of "fixing" and the physiological condition of the eyes — and *probably* with the colour of simple and mixed impinging light (after the manner of curves, Plate V, and curves, Fig. 3, Plate III). The periodicity is large in darkness, much smaller in light, and larger in red light than in blue light. The periodicity changes with shade of coloured light (produced by change of sensation, intensity of light remaining constant). Periodicity unaffected by heart-beat (within limits of 50 to 130).

71. It will have been noted in the curves on Plates I-IV that the counting of the more refrangible rays commenced sooner than the counting of the less refrangible rays; this was due to the fact that the oscillations are more distinct with the I B and G B glasses than with the Y and R glasses, and can therefore be seen more quickly. To see what influence this had upon the results a series was taken with R, G, and I B, in which the counting was begun at practically the same time (3.1 secs.) after "fixation," in each case, however, although the initial periodicities were somewhat closer together than before, the usual order was preserved (viz.: I B .484; G .492; R .502).

Supplement to paper on A Subjective Phenomenon of Vision.

By W. RUPERT TURNBULL, M.E.

June 22nd, 1904.

The more thorough investigation alluded to in the first part of this paper was carried out at Cornell University, New York State, from October, 1896, to December, 1896. With a very accurate chronograph and methods of obtaining pure spectral colours the experiments described in the foregoing paper were very much extended; but the same general results were obtained and the work as a whole may be summarized so as to include both series of experiments.

A further series of experiments carried out in May and June, 1904, shows that the oscillations are quicker when a near object is "fixed" than when a distant object is "fixed," the periodicities in the two cases being $\cdot 544$ seconds and $\cdot 595$ seconds, respectively.

A summary of the chief phases of the phenomenon in all experiments, from January, 1895, to June, 1904, is as follows:

1. The writer, as a boy, perhaps fifteen years before these experiments were begun, saw in the dark a subjective phenomenon of vision, consisting of hexagonal figures (see Fig. 1), composed of more or less distinct "light dust." These figures oscillated as a whole and then streamed from the field of vision.

2. From time to time in the following years these figures were occasionally seen, and in 1895 it occurred to the writer that it would be interesting to study these figures and their oscillations.

3. The more they were studied the more easily they could be recalled, until now, with certain conditions of background, they may be seen at any time, with eyes either open or shut, and the vibrations may be counted—with open eyes the image appears projected on the focussed object.

4. The form of the hexagonal figures as first seen and as often seen in the dark at present remind one very strongly of the illustrations of the magnified crystalline lens cells.

5. The retinal size of the image when light enters the eyes is about $\cdot 183$ mm, whereas the size of the Fovea centralis (the point of accurate vision) is from $\cdot 18$ mm. to $\cdot 225$ mm., therefore the image is seen only at the point of accurate vision.

6. When light does not enter the eyes the retinal size of the image is about $\cdot 47$ mm.

7. The amplitude of the vibrations is about one-tenth the size of the image.

8. The rapidity of the oscillations is affected by four things, viz.:—The colour of the light entering the eyes; the intensity of the light; the distance of the focussed object viewed; and the effort of maintaining a focus so as to count the oscillations.

9. The blue end of the spectrum gives quicker oscillations than the red end.

A more intense light (within moderate limits) gives quicker oscillations than a lesser light.

A near object focussed gives quicker oscillations than a distant object.

And the effort of continuous “fixing” gives varying oscillations, now faster, now slower, with a gradual slowing after long continual effort.

In order to have numerical comparisons the same series alone can be used and average figures would be about as follows, in times for a single oscillation (to and fro):—

Blue light	about	.48	secs.
Red light	“	.52	“
Near dark object	“	.544	“
Distant dark object	“	.595	“
Eyes exposed to darkness for long time...		.700	“

10. Regarding the explanation of this curious phenomenon it is difficult to be sure, but the one that the writer leans to and considers the most plausible is this:—

The several layers of the crystalline lens of the eye are in continuous motions of an oscillatory character, in most persons' eyes this motion is so confused that the well known phenomenon called “light dust” is the only thing observed, but in the writer's eyes, probably on account of a little extra phosphorescence of the crystalline layers, or on account of the unusual keenness of vision the oscillations, by long practice have become so distinct that they may be counted.

With this assumption, that the motions of the crystalline layers (one or more) are visible to the writer, the variations in the periodicities are accounted for as follows:—

The oscillations for blue light are quicker than those for red because the eyes of young people are more sensitive to blue light and less to red than older people (Langley's Researches, Trans. Amer. Journ. Sci., November, 1888), and consequently the reflex action of the ciliary muscle acts more strongly in the case of blue light.

Then the oscillations for a near focus are quicker because the lens is more convex than for a distant object under the control again of the

ciliary muscle. And again, in darkness the eye is focussed on infinity and is consequently most flattened, and here again we have the ciliary muscle most relaxed and the oscillations the slowest of all. The convexity or flattening of the lens, as the case may be, allowing the crystal-line cells to move more or less rapidly, respectively.

Röthesay, N.B., Canada

June, 1904.

Historical Review.

125. Although a somewhat careful search has been made through the available literature, no mention of the phenomenon described in this paper has yet been found. At the same time there are certain phenomena which seem to be rather closely allied to this one, and which I propose here to review.

126. John Purkinje (*Beiträge zur Kenntniss des Sehens in subjectiver Hinsicht* Prag. 1819) is probably the first to describe, with any thoroughness, the appearance of "jumping (or springing) light-points when looking at a bright surface." Purkinje in distinguishing this phenomenon from the well known "*mouches volantes*," says, in Section VII:—"If I gaze fixedly upon a large, almost blinding surface (*e.g.*, upon the evenly-clouded heavens, or close in a candle-flame) there springs up bright points in a few seconds, repeatedly, in the middle of the visual field. These points, without altering their position, quickly disappear again, and leave black points remaining which also quickly go. If, while the light points are springing up I turn the eyes toward a very dark place, or close them, the phenomenon continues as before, only with lessened light, and it seems as if the points were ignited during the first gaze and then gradually died out.

127. This phenomenon (as appears from the above and from subsequent remarks by Purkinje) is undoubtedly different from that seen by the writer; at the same time the phenomena may be allied, as Purkinje's image appeared only *after some seconds of "fixation."* and in *the middle of the visual field.* However, W. Zehender in describing this (Purkinje's) phenomenon recently,¹ as it appears to him, states that the bright-points are immediately visible (and without preliminary "fixing" of a "blinding surface."). He further states that "the phenomenon remains the same by opened and by closed eyes, except that *in the latter case it is much less lively.*"

¹"Klinische Monatsblätter f. Augenheilkunde." März. 1895. The series of five articles, of which this is the first, contain an excellent review of subjective visual phenomena. (The other articles appear in the April, September, October and November Nos. [1895] of the above magazine.)

128. The writer can see the phenomenon described by him, under certain conditions, and, as shown in the curves, Plate I, the oscillations are quicker in light than in darkness. There, therefore, seems to be some connection between these phenomena, although there are certainly decided points of difference, especially with regard to motion. Not having seen the phenomenon described by Purkinje, I can make no distinct comparison.

129. Such, however, is not the case with the following phenomena, described by Helmholtz,¹ for the writer has observed this distinctly (as nearly every one can) and can note no resemblance between it and the phenomenon described by him. The paragraph in Helmholtz referred to runs as follows:—"Bright moving points appear in the visual field if one intently 'fixes' a large, regularly illuminated surface (*e.g.*, the heavens, or snow fields) especially during vigorous walking or other exercise. The points spring from different parts of the visual field, and continue to move quite quickly in very different paths which are, on the whole, not quite straight. There appears also upon the path which one point has taken, new points following the same path, etc."

130. Neither must the phenomenon described in this paper "as first seen" be confounded with the phenomenon described by A. König,² for the writer has observed the König-phenomenon several times, and can note no resemblance. The hexagons, described by König as being visible upon awaking and before opening the eyes in a half-darkened room, are *very much larger* than those described (par. 4) and, moreover they are *stationary and fill the whole field of vision*.

131. Other phenomena which are probably allied to, but can bear no very close comparison with the one in question may be mentioned as follows:—

Vierordt's phenomenon of tortuous and entwined "streamings," which are visible with intermittent light, and also after the blood has been driven to the head through stooping (perhaps similar to the streaming off of the bright points in the phenomenon as first observed (par. 3 *et seq.*). Again, Steinbuch and Purkinje³ have observed, with slight pressure on the eye, rows of flowing spherules. Purkinje observed also, to right and left of a whitish circle, two vertical light lines in which the spherules moved, on the right, downwards; on the left, upwards.

132. Among phenomena which are probably more closely related may be mentioned the following:—

Helmholtz noticed occasionally a flickering, as from small moving bodies when looking at a wall covered with rough lime and illuminated

¹ "Phys. Optik." § 25, 2nd Edition.

² "Eine bisher noch nicht bekannte subjective Gesichts erscheinung." Graefes Archiv., Vol. 30 (3), page 329.

³ "Beobachtungen u. Versuche zur Physiologie de Sinne." Berlin, 1823-25.

by a small window placed very obliquely (an arrangement by which the image seen by the writer is very distinct.)

133. Purkinje,¹ besides the phenomena already mentioned above, describes another one in which he saw a different light after rapid outdoor walking in bright sunshine, and after entering suddenly a dark room. This diffused light he compares to that given off by burning spirits-of-wine, or to the light in darkness of a coating of phosphorus, and he further says that close examination revealed that this glittering mist consisted of innumerable extremely small, irregular light-points, which move in different lines among one another and, gathering now in one place and now in another, form indeterminate surfaces.

134. I, myself, have seen a similar phenomenon when gazing in a snow field, but can note no resemblance between it and the phenomenon described in the foregoing paper. However, Purkinje goes on to say that under certain conditions (one eye open gazing at a bright surface, and one eye shut) he can again see the points, and they appear more lively with opened than with closed eyes, which points to a similarity in the two phenomena.

135. Zehender (citation, par. 127) seems to have observed the phenomena of the "bright jumping points," more easily and more accurately than any other person known to the writer. He sees them by night and by day, with closed and with open eyes. He, however, mentions no regular oscillatory movement in connection with these points and, although the phenomena observed by him and by the writer seem to be very similar they cannot be considered identical unless Zehender did not practise enough to count the oscillations.

136. At the same time Zehender² mentions another phenomenon which, in all the literature accessible to the writer, seems to be the one most closely allied with the one observed by him, although here again are many differences. The passage runs as follows (after mention of a glittering light noticed as one symptom of a certain disease, and also by certain persons in health):—"From my own experience I may mention that I can observe with myself a glittering more or less lively. Especially is this phenomenon observable by early morning, soon after awaking, and it is seen by me very often, I might almost say daily. In the first place, I see, with closed eyes and after daylight obtains, an almost black visual field, in which, corresponding to the direction of sight, there is a bright, pale violet spot with very indeterminate toothed limits. This spot undergoes a continuous restless

¹ "Beobachtungen u. Versuche," I 63. A book exceedingly rich in phenomena of this nature.

² (Citation, par. 127.)

change of form. In the whole visual field one notices besides—as is known—a certain restless motion. Afterwards single points appear, which are quite bright and move spontaneously and which now follow, no longer a “jumping” or “flying,” but *somewhat more a to and fro motion*. The points combine, here and there with one another forming streaks or lines, these increase rapidly and soon form, in place of the pale violet fixation-region, a lustrous spot, which continually increases. The immediate surroundings of this spot gradually darken to pure black; finally the lustrous spot becomes lost in the black surroundings.”

137. It will be noticed from the above that Zehender describes the spot as being seen near the “fixation-region,” and says, that in a certain phase of the phenomenon, the light points have “*somewhat a more to and fro motion*”—in other respects the phenomenon and that observed by the writer are very dissimilar, especially with regard to the violet spot with toothed limits, and the phase in which the spot increases in size.

138. In Zehender's last article (Nov. No., citation, par. 127), we find again some points of similarity and some of dissimilarity between the phenomenon described by him as being due to the pigment granules illuminated from behind and the phenomenon seen by the writer; for instance, he says:—“According to my own experiments, I may assert, that the pigment granules are only visible by night, or in twilight, whereas the circulation of blood is only visible with sufficient brightness (resp. with blinding illumination) and may repeatedly assert, that all pigment motion (perhaps only during a short time) can entirely or nearly cease.”

139. The image that the writer sees is remarkably constant in its motion, and so far as he has ever observed it has never ceased to keep up this regular motion. Moreover, although the image is, perhaps, not quite as distinct in light as in darkness, it is still visible in the writer's eyes whenever sought, under the proper conditions of background and illumination. Zehender believes the granules to be too thickly piled together and to move with too rapid a motion in daylight to be visible. (The average periodicities observed by the writer are:—for the middle of the night about .685 secs, and for the middle of the day about .450 secs.)

140. Zehender believes the most “favourable relations” for seeing the pigment granules obtain where there is a coincidence of psychical awakening and the hours of night or early dawn, in which the eye and its pigment apparatus have not yet awakened to a complete activity.”

141. Zehender's article is too long to be completely reviewed in this place, suffice to say that here and there passages occur which would

lead one to suppose that the phenomena described by him and the writer are closely allied, whereas other passages would lead one to think that if both see the pigment granules, they act in the different eyes in a very different manner. Probably the most concise description of the phases he sees, that correspond at all nearly to the phases seen by the writer is given in the following paragraph:—

“One sees exceedingly fine, more or less bright lighting points which are also in continual motion. Some of these finest lighten up exceedingly bright, others, on the contrary, lighten up weaker, and in part only with the same pale blue colour as the above mentioned spot. Some of these points are indeed quite dark and hardly distinguishable. The motion of these points is not, as in the case with the circulation, a forward locomotion; it is much more a toothlike to and fro trembling in short, straight lines; an emergence and disappearance; occasionally also a short stand-still.

142. The image seen by the writer is so small, and of such a regular nebulous form and constant motion, that in many respects it seems incomparable with the phenomenon as above described. The pale blue colour of some single points lighting up “exceedingly bright,” weaker points and dark ones, disappearances and standstills, accord but poorly with the phenomenon as observed by the writer, and yet in the to and fro motion there is a similarity that points to both phenomena being due to the same cause. Perhaps the writer sees the central part, of Zehender’s phenomenon, and only the central part, but sees it more clearly than Zehender, for, instead of a “to and fro trembling,” the motion has a distinct oscillatory character in my eyes—there is occasionally a very pale blue background to the image seen by me, which may correspond to Zehender’s points, which lighten up with a pale blue colour.

143. A review of the subjective phenomena of vision, in which the circulation of blood in the capillary vessels of one’s own eye is thought to be seen, would here be out of place, as in these phenomena rows of spherules are seen moving, to be sure, but always over the same paths and in the same direction.

144. The quoting of further references of a similar nature to those above is unnecessary. Suffice to say, that in all the literature to which the writer has had access, no mention has been made of either a hexagonal or a nebular image having a regular oscillatory motion; consequently, no mention of the constancy (under certain conditions) of this motion nor mention of the conditions affecting this motion, nor of the changes it undergoes, and not even any attempt to count the oscillations of bright points “having a certain to and fro motion,” which

have been noted by a few writers in describing phenomena, otherwise quite dissimilar to the phenomenon observed by the writer.

145. In concluding this paper, I wish to thank most heartily those who have assisted me — more especially — my wife, and Prof. R. W. Quick, for helping me many times with the stop-watch experiments, Dr. McIntosh, for his careful examination of my eyes¹ and Prof. E. L. Nicols, for kindly reading and criticizing the manuscript.

Rothsay, N.B., Canada.

¹ My eyes were found to be, in every way, normal, and in respect of colour-fields and acuteness of vision, somewhat above the average.

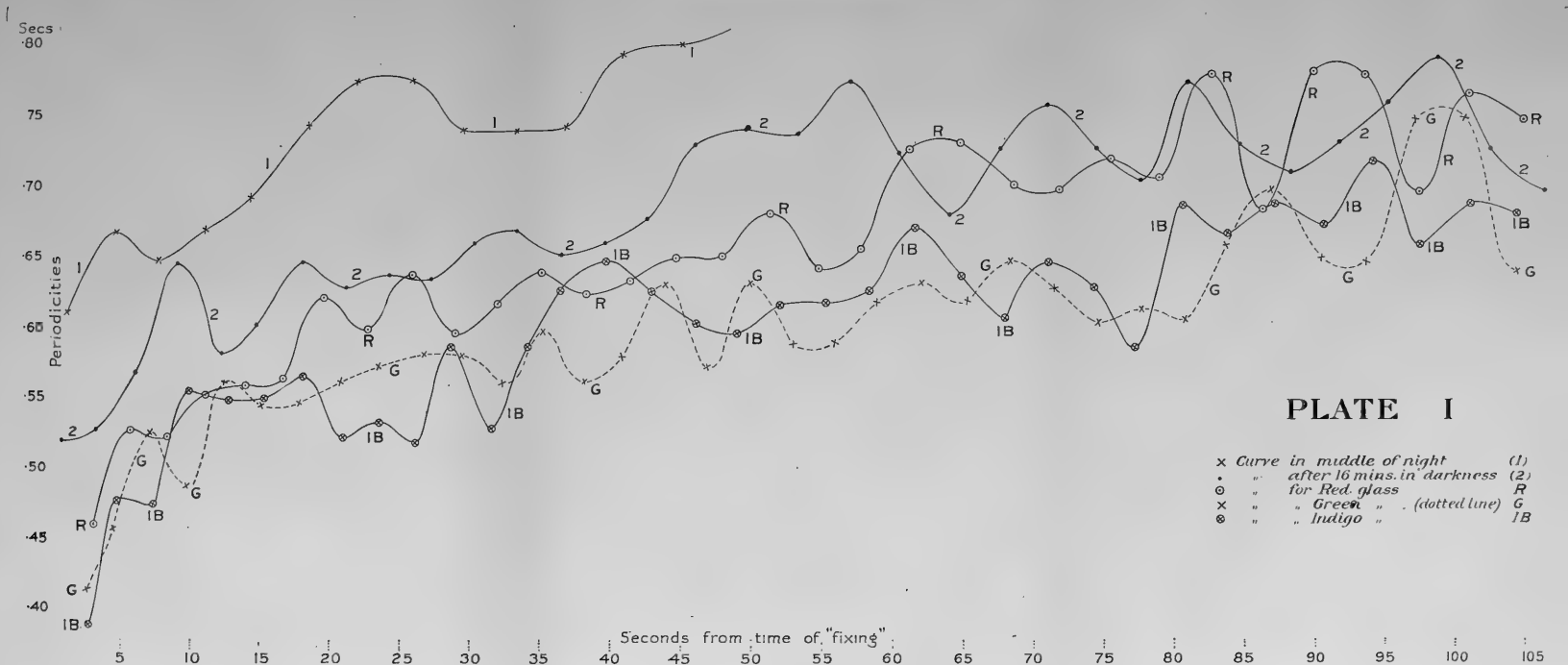


PLATE II

x' Red
 . Green
 o Indigo

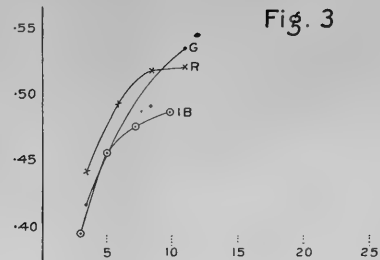
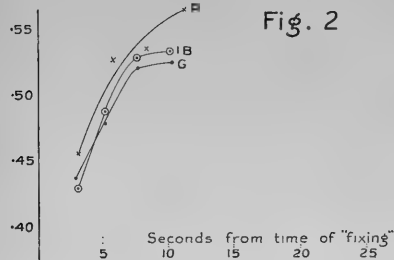
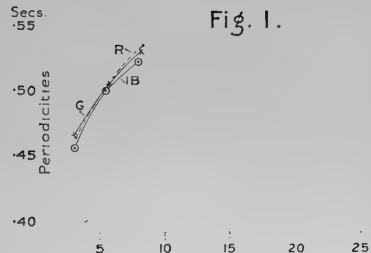


PLATE III

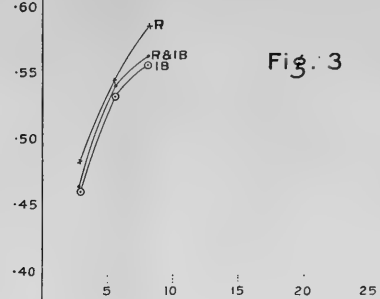
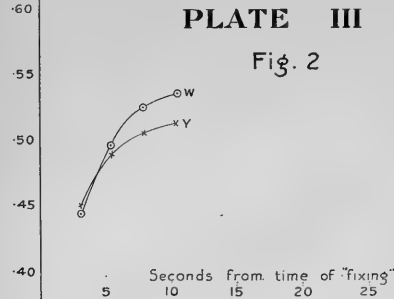
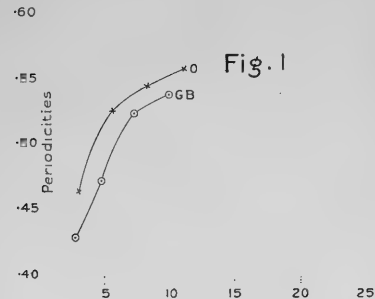




PLATE IV

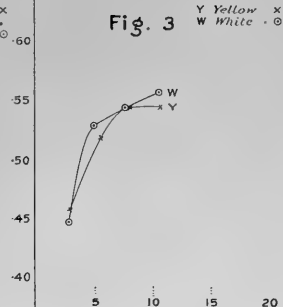
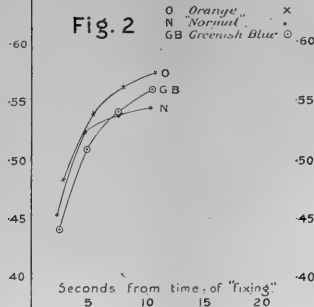
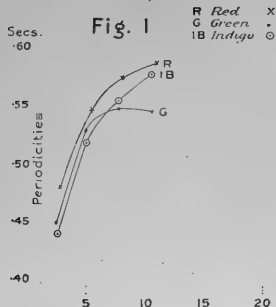
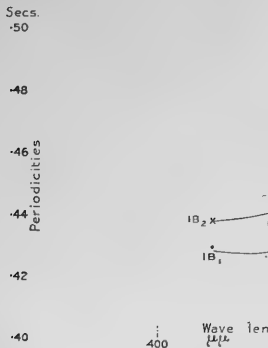


PLATE V



Assumed values of λ for glasses

R	684	$\mu\mu$
O	612	"
Y	567	"
G	521	"
GB	497	"
IB	445	"

Values of Periodicities

R O Y G GB IB

Curve 1. 455 462 448 438 426 430
X Curve 2. 478 482 458 448 440 438

Wave lengths of light
 $\mu\mu$

400 500 600 700

III.—*On the Conservation of Nitrogen in Manure.*

By THOMAS MACFARLANE.

Read May 23, 1906.

On two former occasions ¹ I addressed this section on the loss of substances useful as plant food, and more especially of nitrogen, during the handling and storing of manure. I pointed out that the estimate usually made of the value of the fertilizing substances, obtainable from dwellers in cities, of \$2.00 per year and person was altogether too high; that enormous losses took place in the collecting and handling of the manure, owing principally to the escape of nitrogen in one form or another. It was demonstrated also that this loss took place in spite of the application of substances or acid mixtures ordinarily supposed to be capable of retaining ammonia. These experiments of mine which were begun with the view of deodorising human refuse by means of moss litter, although perfectly successful in that direction and shewing how rapidly the water in the resulting moss manure could be eliminated, all ended as failures so far as the retention of the nitrogen was concerned. Nevertheless I decided to continue the experiments in order if possible to produce a dry and concentrated moss manure without sacrificing any of its most valuable fertilizing constituent, nitrogen. In these trials the material experimented upon was exclusively urine, because of the large amount of nitrogen which its solids contain, and because of the difficulty heretofore experienced in retaining it in natural manures of every description.

I. In order to ascertain whether the recovery of all the nitrogen was possible, by the use of acid and artificial heat, a trial was made in which I made use of the cylindrical wire basket mentioned in my paper of June 1904. Its height was 8 and diameter 6 inches with 3-8 inch meshes, but it was modified by introducing in the centre a small wire cylinder, 6 inches high and two in diameter, through which it became possible to pass a current of heated air and so facilitate evaporation. The moss used in the experiment occupied the space surrounding the internal cylinder which formed a circle 6 inches deep and two inches thick with an outside circumference of about 18 inches. The moss used was a mixture of that from the bog near Caledonia Springs, and that from the Welland marsh. It was saturated with urine to which had been added an admixture of oil of vitriol sufficient to fix the whole of the nitrogen if it happened to be converted into ammonia. The drying was effected by means of the products of combustion from a small gas

¹Transactions of the Royal Society of Canada, Vol. VIII., p. 87; Vol. X. p. 61.

flame which were carried up and through the small internal cylinder. As the drying progressed more of the liquid mixture was added to and absorbed by the moss. Occasionally the contents of the moss space were taken out mixed and then replaced and the trial continued. It lasted about three weeks during which time 7364 grammes of urine were used. The following shews the materials used with their nitrogen contents:—

	Grammes Nitrogen
262 grammes Caledonia Moss with 3.02 per cent N.	7.91
150 grammes Welland Moss with 1.56 per cent N.	2.34
7364 grammes Urine with 0.82 per cent N.	60.38
250 grammes Oil of Vitriol, diluted . . . . .	.....
Total	70.63

Towards the end of the experiment there was considerable blackening of the moss, and some lumps were found at the bottom of the wire basket. The product was thoroughly well mixed, sampled and analysed for its fertilizing constituents with the following result:—

	Per cent.
Nitrogen	7.077
Total Phosphoric Acid	0.800
Potash, K_2O	1.620
Moisture	25.770
Ash	15.970

It weighed in all 1015 grammes and contained 71.76 grammes nitrogen; thus shewing a complete retention of that element.

II. In order to ascertain how much nitrogen the acid added in the foregoing experiment was capable of retaining by this method of treatment the product of experiment I was further treated in an earthenware basin with fresh urine but without additional acid. The basin was very gently heated so that the temperature of its contents seldom exceeded $80^{\circ}C$. The urine was added gradually 6271 grammes being used which contained on the average of five determinations 0.82 per cent nitrogen. The product was dried as well as possible, and, like the others described in this paper, was analysed by Miss S. E. Wright, this time in duplicate, yielding the following results:—

	1	2
Nitrogen	8.79	8.76 per cent.
Total Phosphoric acid P_2O_5	1.76	1.92 per cent.
Potash K_2O	1.73	1.68 per cent.
Moisture	4.65	4.72 per cent.
Ash	19.15	19.35 per cent.

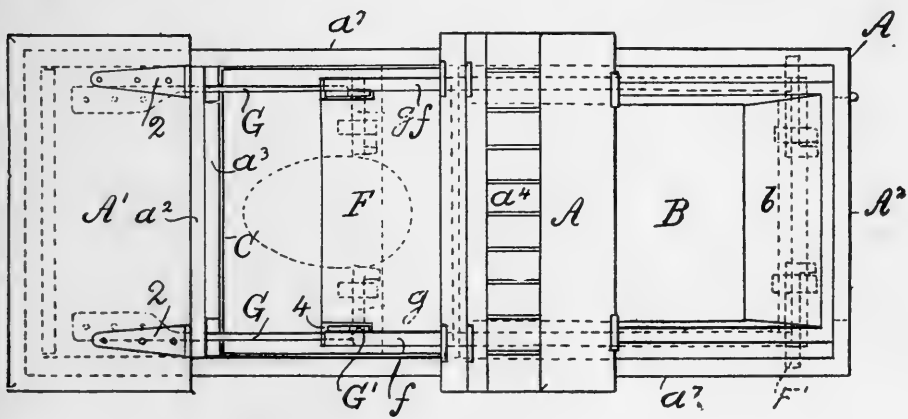
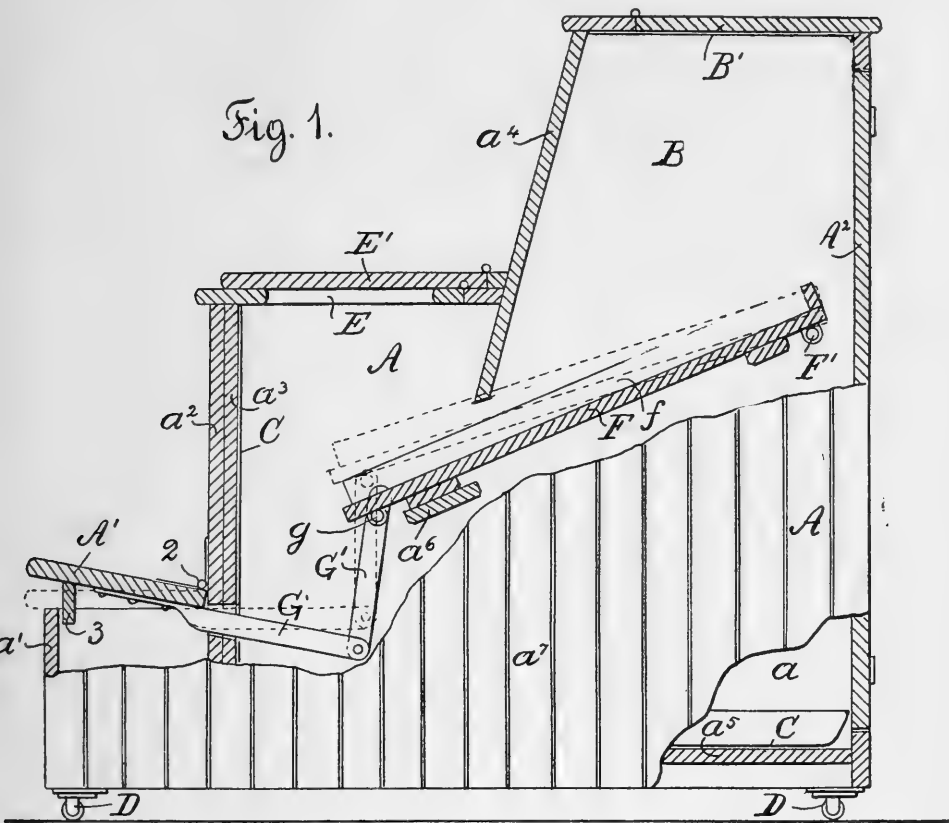


Fig. 2.

The product weighed 1209 grammes and at 8.79 per cent of nitrogen contained 106.27 grammes of that element. The 250 grammes of vitriol used were capable of retaining only 71 grammes of nitrogen as ammonia. The total nitrogen in 13635 grammes urine used amounted to 111.8 grammes; consequently some of it must have been retained in the condition of urea or of its sulphate.

From these experiments it is plain that a complete recovery of the nitrogen in urea is quite possible if a certain quantity of acid is used and the water is expelled gradually by artificial heat. The following experiment performed in an ordinary porcelain capsule furnishes additional proof of this:—

III. 50 grammes of Welland Moss were moistened with a mixture of 50 grammes oil of vitriol and 132 water. The addition of the dilute acid left the moss comparatively dry, nor, on the further addition of 160 grammes urine, was there any unabsorbed liquid on the bottom of the capsule. The whole was then kept at a waterbath heat of 70°C and urine added little by little, until its quantity amounted to 1082 grammes. The drying was continued until the product was fit for sampling when it weighed 178 grammes, and analysed as follows:—

Total nitrogen	5.49 per cent.
Nitrogen as free and saline ammonia . . .	1.15 per cent.
Total phosphoric acid	3.84 per cent.
Potash	8.50 per cent.
Ash	11.56 per cent.
Moisture	33.76 per cent.

The materials used in this experiment were:—

	Grammes	Nitrogen
50 grammes Oil of Vitriol	
50 grammes of Welland Moss with 1.56 per cent N.		0.78
1082 grammes Urine with 0.83 per cent N.		8.98
Total		9.76

The product weighing 178 grammes contained 5.49 per cent nitrogen or 9.77 grammes which accounted for the nitrogen used. Only 20.9 per cent of the latter was present as free and combined ammonia from which it appears that the acid combines with some of the urea and prevents its decomposition.

Having ascertained that the use of sulphuric acid and artificial heat were completely effective in retaining the nitrogen of urine, it became

necessary to make trials towards the same end but allowing the water to evaporate spontaneously. Half a dozen of these were made with such indifferent results as to render their description a most ungrateful task. Still the duty of recording has to be performed, in order that others may be saved from making abortive experiments. The following are selected as sufficient for the purpose.

IV. In a round graniteware dish 200 grammes Welland Moss were treated with successive portions of a mixture of urine and sulphuric acid. from the 23rd April till the 5th Sept., 1904. Each addition of urine with its proportion of acid was only made after the one preceding it had evaporated and left the moss in a comparatively dry condition. The materials used consisted of:—

	Grammes Nitrogen
200 grammes Moss litter with 1.56 per cent N ..	3.12
2493 grammes Urine with 0.82 per cent N.	28.64
106 grammes Oil of Vitriol . . . . .	....
<hr/>	
Total	31.76

The product weighed 505 grammes and contained 3.91 per cent nitrogen or 21.31 grammes, shewing a deficiency of 10.45 grammes or 23.9 per cent. A second sampling was done and the nitrogen again determined including that of any nitric acid that might have been formed. In this case the total nitrogen in the product amounted to 21.87 grammes shewing about the same deficiency. This loss took place even with the use of a fully sufficient quantity of sulphuric acid to fix the ammonia corresponding to the original nitrogen.

In the preceding experiment the spontaneous evaporation was allowed to proceed so far as to leave the moss comparatively dry previous to each new addition of liquid. The following trials V & VI were performed in such a manner as to keep the moss always saturated with liquid. The following is a statement of the nitrogen used and recovered:—

Materials Used (V)

	Grammes Nitrogen
344 grammes Moss with 1.56 per cent N.	5.36
6500 grammes Urine with 0.82 per cent N.	53.30
115 grammes Oil of vitriol . . . . .	....
<hr/>	
Total	58.66

Product

1310 grammes of 2.94 per cent N. as organic nitrogen and ammonia	38.51
Loss 34.35 per cent.	20.15
Material used as above (V)	58.66
1310 grammes product at 3.01 per cent N. including that of Nitric Acid	39.43
Loss 32.78 per cent.	19.23

Materials Used (VI)

200 grammes Moss with 1.56 per cent N.	3.12
3500 grammes Urine with 0.82 per cent N.	28.70
Total	31.82

Product

590 grammes at 3.64 per cent organic and ammonia- cal nitrogen	21.48
Loss 32.49 per cent	10.34
Materials used as above (VI)	31.82
590 grammes product at 3.86 including that of Ni- tric Acid	22.77
Loss 28.44 per cent.	9.05

These latter experiments furnish sufficient proof that in the spontaneous evaporation of urine and the decomposition of its urea all the nitrogen is not eliminated in the form of ammonia otherwise it would have been retained by the large amount of acid used. Very likely the acid would be more effective if applied during the ordinary fermentation of urine and in the presence of sufficient water. But the object of these experiments is to ascertain how the nitrogen of urine is to be secured under the ordinary system of treating manure with excessive exposure to the atmosphere. It has to be confessed that the problem is

yet unsolved, but nevertheless the experiments will be continued in the hope of ultimately attaining success.

So far as regards the trials which have been made to effect the conversion of ordinary excreta into an inoffensive product, which was the chief object in beginning this investigation I am glad to be able to state that they continue to give the most satisfactory results. The most recent arrangement which has come into practice for this purpose is given in the drawing which accompanies this paper.



IV.—*On the Metallic Currency of the British Empire.*

By THOMAS MACFARLANE.

(Read May 23rd, 1906.)

The erection of a new branch of the Royal Mint in Ottawa is an event which suggests enquiry regarding the coins which are to be manufactured there, the relations they should bear to the coinage of other parts of the Empire and whether there is any possibility of introducing some degree of uniformity among the various systems of metallic currency now in use in His Majesty's dominions.

In Canada there circulate at present no gold coins peculiar to the country. These have yet to be designed and manufactured, and this was understood to be one of the objects of the Ottawa Mint. The gold of the Klondike was to be used there instead of finding its way to the United States. Similarly, it was supposed that the silver ores of British Columbia and Ontario would ultimately come to be treated inside of the Dominion, and the resulting metal coined at Ottawa. More recently the question has been raised as to whether some of the subsidiary coins should not be made of pure nickel instead of silver or copper, and whether Canada should not in this respect follow the example already given by France, Switzerland, Italy, Austria and Hungary.

The Swiss Confederation was the first country in the world to introduce pure nickel coinage. Their first issue of 20 centime pieces (4 cents), bears the date of 1883. In 1890, Austria-Hungary followed the example of Switzerland and put in circulation four pure nickel coins. Italy was the next country to adopt nickel for coinage by a bill passed on the 13th February, 1902, authorizing the Royal Mint to coin a 25 centesimi (5 cents) pure nickel piece, and the coins were struck off in 1903. For France a bill was passed in 1903 authorizing the issue of ten millions pure nickel 25 centime (5 cents) pieces which have since gone into circulation.

Moreover, it was announced in Paris in April, 1905, that 56 millions francs worth of copper coin would be retired from circulation at the end of the same year and replaced with nickel as the result of the declaration by eminent medical experts that copper money is an active agent for the spread of many diseases. It has also been stated that the Government of India is now considering the advisability of using nickel as a coinage metal.

There are, however, special reasons why Canada should have a pure nickel coinage. The province of Ontario is the largest producer in the

world of this metal and to bring the crude product into the pure state necessary for coinage would require additional industrial establishments. Among the advantages of pure nickel for coinage may be mentioned its greater resistance to wear, so that the imprint lasts much longer than with silver and copper alloy coins. Besides, they are attracted by a magnet, so that it is impossible to counterfeit them successfully with any cheap white alloy. Pure nickel coins also maintain their bright attractive colour and appearance, and show none of the objectionable tarnishing which is observable on alloy coins containing much copper. Lastly, more powerful presses are required to make nickel coins than for those of nickel alloy, which makes secrecy in counterfeiting the former practically impossible.

Another application of nickel in coinage is as a substitute for the small quantity of copper, with which the more precious metals are alloyed, in the coins of high value. Pure gold and silver are too soft to stand the fear and wear of circulation and for that reason are usually combined with a small proportion of a harder and less valuable metal. Copper is the baser metal thus employed, but it is excelled in hardness by nickel and no doubt the latter, if alloyed with the gold and silver would be much more effective in preventing their loss by abrasion.

The consideration that the use of pure nickel as a coinage metal would encourage the mining for and production of that metal in Canada has its application also in the case of silver. If more of it were used for coinage its present absurdly low price would improve. Indeed, silver has been very ungenerously treated in the past. Its abolition as a standard, side by side with gold, was no doubt perfectly reasonable, but its treatment in other respects is not easily justified. It has been compelled to pay not only for its own coinage but for that of gold as well. Moreover the disproportion between the nominal and the real value of silver coin has been allowed to increase to such an extent as to offer a great temptation to the counterfeiter. The profit made in using it for metallic currency has been so great that some of the self-governing colonies have made efforts to obtain a share of the advantage. Canada has succeeded in so doing, but the profit on the Australian coinage still accrues to Great Britain. All the silver coins of Canada are manufactured at the Royal Mint in London, but the agents of the Dominion purchase the metal for these in the open market at the prevailing low price, and transmit it to the Mint whose authorities only charge three per cent on the face value of the resulting coins for manufacturing them. At the same time it has to be confessed that although a profit of more than one hundred per cent is made in these operations, Canada makes no provision for purchasing abraded coin at its nominal value and with-

drawing it from circulation. The duty thus neglected is carefully performed both by the United Kingdom and Australia, but in Canada there are frequently to be seen in circulation coins on which the figures of the year and value are illegible. A ten cent piece of this description was found to weigh only 2.013 grammes. The standard weight of this denomination is 2.324 grammes, so that the piece referred to had lost 13.38 per cent of its weight by abrasion. 25 cent pieces may frequently be found in our currency with the year and value figures worn off. One of these I found to weigh 5.394 grammes instead of 5.809, which is equal to a loss in the standard silver of 7.14 per cent. The "Mint remedy" or allowance for variation from the standard on such silver coins in the Kingdom is only 0.85 per cent; in India it is 2 per cent, and therefore the tendering of such worn silver coins as are now in circulation in Canada must be entirely illegal.

With regard to the ratio between the value of silver and gold, when used for coinage, which has been adopted for Canada, it is the same as for England and the self-governing colonies, but it may be here pointed out that two such ratios are in actual existence within British Territory, one for India and another for the rest of the Empire. It is tolerably well known that the India rupee, and the English florin contain very nearly the same weight of fine silver, although the former is only worth one shilling and four pence, while the latter has a face value of two shillings sterling. To be precise, the rupee contains 165 grains of pure silver or weighs, with the added baser metal, 180 grains, the fineness being 916.66 per 1000. The florin weighs 174.55 grains of standard silver of the fineness of 925 to the 1000 and consequently contains 161.46 grains of pure silver, or 3.54 grains less than the rupee. Evidently, the value of the silver in the rupee to that of gold must be at least 50 per cent more than in the case of the florin. English silver is coined at the rate of 66 shillings to the old pound-weight Troy or 66 pence per ounce of standard silver, while the market value of the latter at the present time is only about two shillings and sixpence. Since standard gold is worth £3.17.10½ or 934.5 pence per ounce, it follows that the value ratio of silver to gold in English coins is as 14.16 is to 1. This has been the ratio in use for over 90 years, no change having taken place, in spite of the tremendous fall in price of silver during the last thirty-five years.

Fifteen Indian rupees have a legal value of one sovereign, and consequently the latter is equal to $(180 \text{ grains} \times 15)$ 2700 grains of standard silver, and that price is equal to a ratio of gold to silver of 1 to 21.9. This ratio was legally established in India in 1893 and differs greatly from that in use elsewhere in the British Empire.

The present seems a very convenient time for endeavouring to put an end to the anomaly of having two ratios co-existent in the British Empire, and from a Canadian point of view there is much to be said in favour of adopting the Indian ratio in the new Mint. This change would tend to appreciate the value of silver, and bring the intrinsic value of the coins considerably closer to their face value. In the United Kingdom and its Colonies the difference between the real and nominal value of the coins is too great. For instance a 50 cent piece in Canada contains silver to the value of about 23 cents. The inducements to counterfeiters are very tempting and the difficulty of detecting counterfeit coins made of the same fineness as standard silver is very great. Indeed there can be no certainty that all the silver coin now in circulation is genuine. On this point Mr. Probyn (*Proceedings of the Royal Colonial Institute*; Vol. XXI, p. 123) says:—"It is however possible to fix the nominal gold rate of silver too high. Thus an inducement to the fabrication of illicit coins of precisely the same intrinsic value is held out; coins which it must be very difficult to distinguish from lawful coins, and this state of things has been brought about in England owing to the fall of the gold price of silver. We have lately seen reports in the press of the manufacture of illicit good silver coins, in one instance it being stated that, to avoid detection, the manufacture was being carried on on the high seas; and in other countries as well, where the profit is not so great though the opportunity of getting the coins into circulation is better, we hear of the same thing. It appears therefore probable that, if the gold price of silver remains as at present, the law will have to be amended, in view to the nominal gold rate of silver in our currency silver being lowered, and the silver coins being made more valuable." From this quotation it is evident that if there are no "illicit good" silver coins circulating in Canada, the people are indebted, not to the wisdom of their rulers, but to the vigilance of their detective organizations. Such vigilance does not appear to exist or to be effective in the United States, where there are said to be large quantities of the pure counterfeits in circulation. It is of course quite possible that a great deal of the American silver circulating in Canada may be of the same illicit description. It has to be considered that Mr. Probyn's paper was written in 1890 when the price of standard silver was about 45 pence. The danger referred to is of course much greater now that the price is about two shillings and sixpence.

The branch Mints in Australia manufacture only gold sovereigns for use there and largely for export to other parts of the world. The silver currency is all coined in London, and the Commonwealth authorities pay for it at the face value, but the obligation to purchase and

remint abraded coin rests upon the Royal Mint. The Australian Mints acting as agents of the Imperial government receive worn silver coin from the banks at its nominal value. The worn coin is melted by the Australian Mints and shipped to London in ingots, the Imperial government paying all expenses for delivery at the Royal Mint, London, and also bearing the loss on recoinage. This arrangement does not seem to have been entirely satisfactory to the Commonwealth, and its government made an effort to obtain some of the profit of coining which they supposed to be very large. In June, 1901, the House of Representatives appointed a select committee "to enquire into and report upon the desirableness and expediency of the Commonwealth coining gold, silver and copper coins, and adopting a decimal system of coinage." The Committee reported in April, 1902, and among other opinions, expressed the following:—"Since 1873 the seigniorage on the silver coinage has steadily increased till it now amounts to over 130 per cent on the cost of the silver. Upon silver bullion costing £733.013 purchased by the Royal Mint in 1900, the profit in coining was £974.519 or 133 per cent. On the bronze coin operations for the same year a profit of £119.042 is shown. In the opinion of the Committee no reason exists why the Commonwealth should not receive this seigniorage on the amount of the token coinage it requires, accepting the corresponding liability of restoring the worn coin of its currency from time to time. To secure this a special token coinage not current outside the limits of the Commonwealth is preferable, and the opportunity should be availed of to make that coinage a decimal one." The report was adopted in June, 1903, by the House of Representatives on the following motion:—That in the opinion of the House, the necessary legislation should be introduced to give effect to the recommendations contained in the report of a Select Committee on Commonwealth coinage and currency.

Previous to any further steps in the direction of legislation or executive action, the Report was submitted to various authorities, chambers of commerce, public bodies, and employers unions in the Commonwealth for an expression of their opinions. There were over seventy of these consulted, most of whom sent replies. About one half were in favour of delay or no change for the present, and the other half were for immediately decimalising the currency. It does not appear that since December, 1904, any further action has been taken to obtain a new arrangement with the authorities of the Royal Mint regarding silver coinage for Australia. Of course many of the reasons above given for adopting pure nickel as a metal for the subsidiary coins of Canada apply also to the smaller coins used in Australia, England and other parts of the Empire.

The adoption of such can, however, scarcely be advocated without at the same time discussing the possibility of inventing an Imperial Coinage.

The system of decimal coinage recommended by the Australian Committee was the adoption of the sovereign as the standard of value, and the division of the florin into 100 parts to be called cents. If carried into actual practice it would simply add another to the many discordant systems of metallic currency now existing within the Empire, and result in making uniformity in Imperial Coinage quite unattainable. It did not form any part of the instructions to the Committee to consider the possibility of establishing such uniformity, but they paid some attention to the prospects of currency reform in Great Britain, and to the probable direction of that reform. Many of the witnesses and authorities consulted by the Committee tempered their advocacy of the decimal system by a recommendation to await the action of Great Britain. The committee, however, ascertained that the Lords Commissioners of the Treasury are of opinion that "the difficulties connected with any change of our coinage system are so great that there is no likelihood that the question will engage the attention of His Majesty's Government in a practical way."

The difficulties just referred to, regarding the coinage of the United Kingdom, will of course also be met with in any attempt to invent a metallic currency for the Empire. It is quite possible, however, that they have been exaggerated, and many of them appear to have their origin in a predetermination in every event to retain the British sovereign. That coin was also the object of the Australian committee's solicitude when it declared that "from the reports of similar inquiries in Great Britain as well as from the evidence of competent witnesses it would seem that the retention of the sovereign as the standard of value is the only basis upon which a decimal coinage proposal would find favour in that country." Possibly, however, the abandonment of the poor man's penny might be just as unpopular as the abolition of the rich man's sovereign, and adopting the penny and half-penny system decimally would compel the alteration of the sovereign. Much information on this subject is contained in the Australian report already quoted from.¹ Two additional essays concerning Imperial coinage also deserve study; the one by Mr. Probyn already mentioned, and the other entitled "An Imperial Coinage"² by Filelis (Arch. McGoun, K.C., Montreal.)

Mr. Probyn shews very clearly that "there is a great diversity, not merely of system but of details in the same system, throughout the

¹ Report on Coinage: D4.— F. 8797. Robt. S. S. Brain, Government Printer, Melbourne; also, No. 62 F, 13542 and No. 60 F, 13135.

² The Commonwealth 1901, p. 202.

"Empire," and mentions the suggestion "that our new double florin should be treated as a dollar, and that it might become the dollar of the Empire." He does not, however, elaborate any new plan of introducing uniformity. On the other hand, Filelis adopts the following propositions and works them out in detail:—

1. The unit for an Imperial Coinage must be the pound sterling.
2. An Imperial Coinage must be sub-divided on the decimal system.

This is essentially the same plan as recommended by the Australian Committee. In Filelis system 'the chief coin of account,' would be the one which would pass current for the tenth part of a pound. Such a coin the United Kingdom already possesses in the two shilling piece or florin, and its retention is proposed. "The next 'coin of account' would be about two and a half pence, or very nearly the same as our five cent piece, and it might be called a groat, as the four-penny groat has passed out of use. The smallest coin of account would be the 1000th of a pound, and would approximate very closely in value to the present English farthing, the name and place of which it might very appropriately take."

This system excludes dollars and cents, substituting in fact, florins and farthings for them, and no effort is made to harmonise it with the currency of Canada or of the United States. The problem is, however, one that cannot be solved by inventing a system of coinage theoretically perfect. The question is rather how uniformity can be introduced, a decimal system established, and the present coins utilised, with the fewest possible changes, and in the easiest possible manner. It seems possible to maintain that this can best be done by adopting as the unit the double florin mentioned by Mr. Probyn, or the Canadian dollar, which is the same as that of the United States. In gold the United States dollar has a legal weight of 25.8 grains (Fineness 900), which corresponds closely to the 25.68 grains (Fineness 916.66) of the Newfoundland gold dollar. In fine gold these coins contain respectively 23.22 and 23.54 grains, so that, as Mr. Probyn says, "It will be seen that the Newfoundland dollar is worth a trifle more than the Canadian dollar." There are other parts of the Empire where a dollar of nearly the same value as the Canadian dollar is in use, and therefore some ground for inquiring as to whether this coin would not be the best unit for an Imperial coinage, and most easily introduced as such.

The chief and almost the only alteration necessary for establishing uniformity and utilizing by far the greatest number of the coins now current within the Empire is to add a little more gold to the sovereign, making it nearly equivalent to the old English guinea, and equal to \$5.00

SILVER.	No. of cents.
Crown = 5/ — \$1¼	125.
Double florin or dollar = 4/	100.
Half Crown = 2/6	62.5
Florin = Half Dollar = 2/	50.
Rupee = 1/4	32.
Shilling = quarter dollar	25.
Sixpence	12.5
Groat	8.0
3 d. piece	6.

COPPER PIECES.	
Penny = One Anna — One sixteenth Rupee	2.0
Half Penny, copper or cent	1.0
Farthing = One pice (Indian)	0.5
Mauritius cent	0.33
Centime	0.20
Pie (Indian)	0.16
Mill	0.10
Mauritius quarter cent	0.08

It will be seen that in this list of British coins there are none to represent 10 cents and 5 cents, and if the latter were made as suggested, of pure malleable metallic nickel, the list of essentially Imperial coins would stand as follows:—

GOLD PIECES.	Value in cents.
Double Guinea, "Empress" or "Edward"	1000.
Guinea (New Pound)	500.
Half Guinea	250.
Dollar or Double florin	100.

SILVER PIECES.	
Florin	50.
Rupee	32.
Shilling	25.
Dime or five pence piece	10.

NICKEL PIECES.	
Nickel, or twopence half penny	5.
Penny or Anna	2.
Cent, Half penny, or copper	1.

BRONZE PIECES.	
Farthing or pice (Indian)	0.5
Mill	0.1

Accounts in England and the Colonies of Australia and South Africa could be put on a decimal basis by regarding the double guinea as the unit instead of the pound, and it would be an easy matter to re-

member that one "Empress" equals two guineas. In Canada the unit of account would be as heretofore the dollar, and it would be easy to remember that one double guinea or Emperor equals \$10.00. Instead, therefore, of the principles advocated by Filelis, the following seem to be preferable:—

1. The units for a common Coinage should be, as preferred in different parts of the Empire, either the "Empress" equal to 40/ Sterling, or the Dollar equal to 4/.
2. Both of these units should be sub-divided on the decimal system.

From this relation it is evident that if the new Branch Mint in Ottawa were at once to begin coining five, two and one cent pieces, in pure metallic nickel, these would ultimately find their right and useful place in an Imperial Coinage on the system above described as probably the most practicable. In any case the subject deserves close and immediate investigation, and that should take place before the coining presses of the new Mint are ordered, or the Government of the Australian Commonwealth adopts any decided action. Much of the expert evidence before the Australian Parliamentary Committee goes to shew that the simultaneous coining, in a mint of ordinary capacity, of more than one metal, carries with it great difficulties. In all probability it will be found most convenient and profitable to devote the Ottawa Mint to the manufacture of subsidiary pure nickel coins for the whole Empire.

It will be evident that the introduction of the new coinage metal and the adoption of a uniform Imperial Currency is a matter of great urgency. The Commonwealth authorities are ripe for immediate action, and could possibly be shewn the advantages of adopting the Canadian plan. These could also be explained to other governments of the outer Empire and more especially that of India which is now considering the advisability of adopting modifications in its system of coinage.

When Sir William Mackinnon, Bart., was written to regarding the decimalisation of the Australian Coinage he replied disapproving of that step and added "whatever is done I think the coin of India should be assimilated to that of Great Britain. The Indian rupee contains exactly, or as near as possible, exactly, the same quantity of silver that our florin does. A basis is therefore established for uniformity and an arrangement of this sort might be helpful to the Government of India in re-organizing their financial system which they are bound to do before long." On referring to the list of essentially Imperial coins given above it will be found to include the rupee, anna and pice, so that the system proposed in this essay indicates certain steps towards the assimilation desired. According to Mr. Probyn the anna "is only a nominal division there being no corresponding coin." It would be

most fitting to inaugurate the new departure by striking a new coin of this value in pure nickel, and by coining the fractions of the rupee below ten cents in value also of this metal. The copper token coins now in circulation in India representing one thirty second, one sixty fourth, a one hundred and twenty-eighth, and a one hundred and ninety-second of a rupee, and called respectively double pice, pice, half pice and pie, with the exception of the last named, also fit decimally into the system now advocated. The value of the pie would probably have to be increased so as to make it equal to one-tenth of an anna, in which case the half-pie would become the smallest coin in the British Empire and equal to the mill in the list of essentially Imperial coins above given. These changes would cause the Indian coins to represent the values in Imperial cents given in the following list:—

SILVER PIECES.

	cents.
Rupee..	32.
Half-rupee..	16.

NICKEL PIECES.

Quarter rupee..	8.
One eighth rupee..	4.
Anna..	2.
Double-pice..	1.

BRONZE PIECES.

Pice..	0.5
Half-pice..	0.25
Pie..	0.2
Half-pie..	0.1

In view of the possibility that action may at any moment be taken by the Governments of Australia and India and changes made in their respective currencies it is urged that the Dominion Government should consider the advisability of making such representations to them as would cause them to take into consideration the proposals contained in this memorandum. It is also suggested that the authorities of the Royal Mint be consulted and requested to prepare a set of models of the coins of the new system, so that this could be laid before His Majesty as well as the representatives of the Governments above mentioned. It would also be advisable to place a set of these coins on exhibition in the Imperial Institute, London, so that the public might become acquainted with them and form their opinions as to the advantage of adopting them in a system of Imperial metallic currency.

OTTAWA, 23rd February, 1906.



V.—*On the Analysis of Wheaten Flour.*

BY

THOMAS MACFARLANE.

Read May 23, 1906.

In a former paper presented to this section "On the determination of the Constituents of Gluten,"¹ a method of examining wheaten flours was described which seemed to promise analytical results likely to bear some definite relations to the phenomena observable in bread making. It is well known that the same standard brands of flour vary from year to year in regard to their excellence for yielding good bread, and it is usually supposed that these variations are owing to differing climatic conditions at the time of harvesting the wheats from which the flours were produced. It was therefore thought possible that by applying the method above mentioned to the examination of well known standard grades of flour from year to year variations in their composition might be detected which might be found to correspond with variations in their excellence for purposes of bread making. Accordingly the two largest flour milling companies in the Dominion were applied to for reliable samples of their best products from the crops of the past three seasons. These were supplied with the greatest willingness, the different grades being as follows:—From the Lake of the Woods Milling Co., "Five Roses," "Patent" and "Medora"; from the Ogilvie Flour Mills Co., "Royal Household" and "Glenora."

The results of examining these five grades of flour from the crops of 1903 and 1904 were given in my paper of last year, and since then the same grades from the crop of 1905 have been subjected to exactly the same processes of analysis as the former samples. Consequently the results of the examination of the same grades for three consecutive seasons are now available for comparison. Besides the samples of "Royal Household" and "Glenora" obtained direct from the Ogilvie Flour Mills Co., the same qualities were purchased from Mr. A. Martin, a dealer in the city of Ottawa, Jan. 1, 1906, and examined in the same manner. All the results have been given in Table I which here follows:—

¹ See Transactions, 1905 ; Section III, p. 17.

TABLE I.

Description of Samples of Wheaten Flour.	P.c. Moisture.																	
	0	1	2	3	4	5	6	8	10	11	7	9	12	13	14	15	16	17
From Lake of the Woods Milling Co.	P.c. Total Proteids = N x 5.7.																	
	P.c. Dry Gluten.	P.c. Crude Dry Glutenin.	P.c. Crude Gliadin.	P.c. Water Soluble Pro- teids.	P.c. Pure Gliadin.	P.c. Pure Glutenin.	Sum of Percentages Pro- teids in Products.	Difference between total Proteids and those in Products.	P.c. Dextrinoids with Crude Gliadin.	P.c. Non-proteids with Crude Glutenin.	Sum of Percentages of Gluten Proteids.	Ratio of total Proteids in Flour to dry Gluten as 1	P.c. Gluten Proteids from total Proteids of flour.	P.c. Pure Gliadin from total Proteids of flour.	P.c. Pure Gliadin in Gluten Proteids.	P.c. Nitrogen in crude Gliadin or Alcoholic Extractive.		
Five Roses, 1903-4.....	9.00	10.54	11.06	4.97	6.09	1.18	3.61	4.26	9.05	1.49	2.48	0.71	7.87	74.66	34.25	45.87	10.41	
" Duplicate.....	9.04	10.54	11.79	4.90	6.89	1.21	3.41	4.08	8.70	1.84	3.48	0.82	7.49	71.06	32.25	45.53	8.65	
" 1904-5.....	8.62	9.65	10.31	4.79	5.52	1.24	3.64	3.81	8.69	0.96	1.88	0.98	7.45	77.20	37.72	48.86	11.61	
" Duplicate.....	8.54	9.65	10.22	4.66	5.56	1.23	3.60	3.84	8.61	0.96	1.86	0.82	7.44	77.09	37.30	47.98	11.37	
" 1905-6.....	9.76	10.69	9.75	6.18	5.57	1.03	3.82	4.14	9.61	1.08	0.25	2.04	7.96	91.74	35.73	47.99	18.37	
" Duplicate.....	9.60	10.45	9.72	6.11	5.61	1.42	3.78	4.22	9.32	1.13	0.17	1.99	7.90	93.03	36.17	47.85	18.36	
Patent, 1903-4.....	8.00	10.05	13.44	7.29	6.15	1.29	4.22	5.03	10.54	0.61	1.68	2.26	9.25	95.63	46.93	45.93	12.05	
" Duplicate.....	8.04	10.05	13.76	7.99	5.97	1.38	4.29	4.99	10.66	0.61	1.68	2.26	9.25	95.63	46.93	45.93	12.05	
" 1904-5.....	8.88	10.13	11.83	6.01	5.82	1.12	4.41	3.97	9.50	0.64	1.52	2.17	8.36	1.17	82.73	43.54	52.62	13.02
" Duplicate.....	8.88	10.13	12.05	6.16	5.89	1.13	4.37	3.99	9.49	0.64	1.52	2.17	8.36	1.18	82.53	43.14	52.27	13.02
" 1905-6.....	9.28	10.53	12.40	7.05	5.35	0.87	4.12	5.15	10.14	0.39	1.23	1.90	9.27	1.18	89.03	39.12	44.34	13.50
" Duplicate.....	9.36	10.76	12.29	7.07	5.22	0.93	4.15	5.02	10.10	0.66	1.07	2.05	9.17	1.14	85.22	38.57	44.25	13.98
Medora, 1903-4.....	7.40	12.24	13.34	7.24	6.22	1.38	4.32	4.67	10.37	1.87	1.90	2.45	8.99	1.09	73.44	35.29	48.05	12.18
" Duplicate.....	7.32	12.24	13.31	7.24	6.22	1.40	4.54	4.88	10.82	1.42	1.53	2.36	9.42	1.08	76.96	37.09	48.19	13.14
" 1904-5.....	8.00	11.41	12.33	6.10	6.23	1.18	4.48	4.25	9.91	1.50	1.75	1.85	8.73	1.07	76.51	39.26	51.32	12.62
" Duplicate.....	7.96	11.41	12.24	6.04	6.04	1.20	4.46	4.42	9.88	1.53	1.58	1.82	8.88	1.07	76.07	39.09	51.38	12.94
" 1905-6.....	7.60	12.60	12.42	6.91	5.51	0.94	4.88	4.37	10.19	2.41	0.63	2.54	9.25	0.98	73.41	38.73	52.76	15.53
" Duplicate.....	7.52	12.36	12.10	6.57	5.53	1.07	4.84	4.30	10.21	2.15	0.69	2.27	9.14	0.98	73.95	39.16	52.95	15.35
From Ogilvie Flour Mills Co.																		
Royal Household, 1903-4.....	6.68	11.97	11.62	6.56	5.06	1.16	4.13	5.54	10.83	1.14	0.93	1.02	9.67	0.98	80.78	34.50	42.71	14.33
" Duplicate.....	7.00	11.97	11.77	6.87	4.90	1.19	4.20	5.56	10.95	1.02	0.70	1.31	9.76	0.98	81.54	35.09	43.03	15.02
" 1904-5.....	8.16	10.27	10.90	5.18	5.72	1.27	4.25	4.37	9.89	0.38	1.47	0.81	8.62	1.06	83.77	41.30	49.30	13.04
" Duplicate.....	8.12	10.05	10.88	4.90	5.98	1.29	4.31	4.34	9.94	0.11	1.67	0.56	8.65	1.08	86.07	42.88	49.82	12.64
" 1905-6.....	8.08	11.97	11.23	6.14	5.09	0.80	4.18	4.47	9.45	2.52	0.91	1.67	8.65	0.91	72.26	34.92	48.32	14.40
" Duplicate.....	8.00	12.53	11.44	6.26	5.18	1.10	4.36	4.49	9.95	2.58	0.82	1.77	8.85	0.93	70.63	34.79	49.26	14.80
A. Martin, Rideau St., Ottawa.....	10.12	12.29	11.39	6.00	5.39	0.95	4.30	4.33	9.58	2.71	1.09	1.67	8.63	0.93	70.22	34.99	49.82	14.00
" Duplicate.....	10.32	12.04	11.52	6.33	5.26	0.96	4.34	4.46	9.76	2.28	0.92	1.87	8.80	0.96	73.09	36.04	49.32	14.46
Glenora, 1903-4.....	6.40	11.65	14.64	8.08	6.05	1.27	4.22	6.75	12.24	0.59	1.84	1.33	10.97	1.21	94.16	36.22	38.47	12.23
" Duplicate.....	6.40	11.65	14.61	8.01	6.60	1.74	4.25	6.70	12.19	0.54	2.35	1.31	10.95	1.24	93.99	36.48	38.81	11.30
" 1904-5.....	8.52	9.73	12.09	7.11	4.98	1.17	4.05	5.09	10.31	0.58	0.93	2.02	9.14	1.24	92.83	41.62	44.31	14.27
" Duplicate.....	8.48	9.89	12.13	7.02	5.11	1.13	4.00	5.16	10.29	0.40	1.11	1.86	9.16	1.22	92.62	40.40	43.75	13.73
" 1905-6.....	8.36	12.29	13.52	7.82	5.70	1.24	4.54	5.00	10.78	1.51	1.16	2.82	9.54	1.10	77.02	36.94	47.70	14.00
" Duplicate.....	8.28	12.68	13.34	7.66	5.68	1.19	4.49	5.04	10.72	1.96	1.19	2.62	9.53	1.05	75.15	35.41	47.11	13.89
A. Martin, Rideau St., Ottawa.....	9.32	12.37	14.16	7.25	6.91	1.09	4.57	4.95	10.61	1.76	2.34	2.30	9.52	1.15	76.99	36.94	48.00	11.62
" Duplicate.....	9.08	12.68	14.53	7.28	7.25	1.13	4.61	4.98	10.72	1.96	2.64	2.30	9.59	1.15	75.61	36.36	48.07	11.16

The numbers placed at the head of the various columns in this table are the same as used in my paper last year, but for the sake of convenience, the manner in which the figures were obtained is now explained as briefly as possible:—

0.—In this column the percentage of moisture which the flours contain is given in duplicate, the determinations having been made by distributing the flours in chrysotile fibre and drying over night (18 hours) at 70°c.

1.—The percentages of total proteids in this column were ascertained by determining the nitrogen in the undried flour by the Kjeldahl method and multiplying the percentage of nitrogen by the factor 5.7 in accordance with the results of the investigations of Osborne & Voorhees.

2.—In determining the dry gluten the old method of making a dough ball and washing out the starch with an indefinite quantity of water was abandoned. Ten grammes of flour were made up with just sufficient distilled water in the usual way, and after waiting 30 minutes, the dough ball was treated with 250 cubic centimetres of distilled water. The latter was placed in a separating funnel and delivered drop by drop on the dough while it was being kneaded. The wash water and starch were received in a sieve made of No. 12 bolting cloth, and any particles of gluten caught in it were recombined with the wet gluten ball under treatment. The above mentioned quantity of water, used as described, was found to be quite sufficient for the elimination of the starch in 10 grammes of flour. The starch passed through the sieve and was collected with the wash water in a basin placed underneath. The gluten was deprived of as much water as possible, dried at 98°c for 28 hours and weighed. This determination was done in duplicate like that of the others still to be described.

3.—Ten grammes of the flour were treated in the manner just described up to the point of obtaining the wet gluten. Then the latter, without being dried, was securely enclosed in a small piece of fine muslin which had been previously dried and weighed. The whole was then subjected to treatment with 250cc of 70 per cent alcohol, contained in a separating funnel, and delivered drop by drop upon the wet gluten contained in the muslin which was being carefully kneaded at the same time. This operation has to be performed very gently and without causing any particles of the gluten to be expressed. After drying, the weight of the resulting content of the muslin gives the quantity of the crude glutenin contained in the flour. The drying and weighing is done in the muslin, the weight of the latter being deducted.

4.—The percentage of crude glutenin (3) subtracted from that of the dry gluten (2) gives the percentage of loss which the gluten had

sustained in the treatment with alcohol, which loss is designated as "Crude Gliadin."

5.—The water used in the production of the gluten, together with the suspended starch from 20 grammes of flour were well mixed, made up to 500ccm and allowed to stand until the starch had subsided. 250ccm of the supernatant liquid were then filtered off and used for the determination of the water soluble proteids. It may here be stated, with respect to the starch deposit, and its possible contents in minute particles of gluten, that its treatment by the Kjeldahl method was found to be exceedingly tedious, so that the determination of its nitrogen had to be abandoned.

6 and 7.—The alcoholic solution obtained as described under 3 was evaporated to small bulk and its nitrogen determined. This multiplied by 5.7 gave pure gliadin (6) the percentage of which was always less than the "crude gliadin" obtained, as above described, by difference. It is thus evident that 70 per cent alcohol dissolves out of the gluten, other substances besides gliadin. Their amount was ascertained by deducting the percentage of "pure gliadin" from that of "crude gliadin," and has been provisionally termed "dextrinoids" (7)

8 and 9.—In a similar manner the cake of dried crude glutenin was Kjeldalised and the amount of pure glutenin calculated from the nitrogen. In making this determination the glutenin was not removed from the muslin, and the latter underwent digestion in the Kjeldahl process. The very small quantity of nitrogen contained in the muslin was neglected. The pure glutenin (8) deducted from the crude glutenin (3) gave a percentage which I have designated as "non-proteids in Crude Glutenin" (9).

10.—In this column is given the sum of the proteids determined in the various products yielded by the flour, in order to compare it with the total proteids found in the sample by direct determination of the nitrogen (1).

11.—This column shews the differences between 10 and 1, namely, the loss or gain which the total proteids of the flour sustained by the analytical treatment. Sometimes there is an overplus and the nitrogen has been fully accounted for, but in the majority of cases there is a deficiency varying from 0.11 to 2.71 in the percentage of total proteids. Since the nitrogen was determined in all the products, except the separated starch, it would seem reasonable to suppose that it contains the missing proteids. In this case they are probably in the form of the particles of glutenin, which, on account of deficiency in adhesiveness, the gluten was unable to retain.

The following columns do not embrace any additional determinations but simply contain calculated figures given for purposes of comparison.

12.—Sum of the pure proteids, gliadin (6) and glutenin (8) contained in the gluten.

13.—Ratio of total proteids in flour to dry gluten.

14.—Percentage of gluten proteids (pure gliadin + pure glutenin) obtained from the total proteids of the flour.

15.—Percentage of pure gliadin obtained from the total proteids of the flour.

16.—Percentage of pure gliadin in the gluten proteids.

17.—Percentage of nitrogen in the crude gliadin or the extract by alcohol. It varies from 8.65 to 18.77 per cent the latter figure being higher than that required by the factor 5.7 which is 17.5.

As has already been remarked, Table I contains all the analytical results obtained by the methods above described in making analyses of the 5 standard grades of flour from three consecutive seasons. Duplicate tests were made in the case of 13 samples and quadruplicates in 21 samples, so that there are 34 analyses in all, the work of which was performed under my direction by Miss S. E. Wright, assistant analyst in the Inland Revenue Laboratory. It is impossible at present to make complete use of all these figures, and they are thus placed on record in order that they may be available for future reference. They are too voluminous for purposes of comparison, and I have therefore selected from among them certain series of figures and placed them in Table II so as to furnish such a conspectus, as will enable parallels to be drawn between the properties of the flours and the general characters of the crops which yielded their wheats.

II.—SELECTED RESULTS OF EXAMINING STANDARD SAMPLES OF WHEATEN FLOUR.

Brand.....	FROM LAKE OF THE WOODS MILLING CO.										FROM OGILVIE FLOUR MILLS CO.					
	Five Roses.			Patent.			Medora.			Royal Household.			Glenora.			
	1903-4	1904-5	1905-6	1903-4	1904-5	1905-6	1903-4	1904-5	1905-6	1903-4	1904-5	1905-6	1903-4	1904-5	1905-6	
Season.....																
Total Proteids (1).....	10.54	9.65	10.69	10.05	10.13	10.53	12.24	11.41	12.60	11.97	10.27	11.97	11.65	9.73	12.29	
Dry Gluten (2).....	11.06	10.31	9.75	13.44	11.83	12.40	13.34	12.33	12.42	11.62	10.90	11.23	14.14	12.09	13.52	
Ratio of Proteids to Dry Gluten 1 to (13).....	1.05	1.07	0.91	1.33	1.17	1.18	1.09	1.07	0.98	0.98	1.06	0.91	1.21	1.24	1.10	
Crude Glutenin (3).....	4.97	4.79	6.18	7.29	6.01	7.05	7.12	6.10	6.91	6.56	5.18	6.14	8.08	7.11	7.82	
Non-proteids in Crude Glutenin (9)	0.71	0.98	2.04	2.26	2.04	1.90	2.45	1.85	2.54	1.02	0.81	1.67	1.33	2.02	2.82	
Crude Gliadin (4).....	6.09	5.52	3.57	6.15	5.82	5.35	6.22	6.23	5.51	5.06	5.72	5.09	6.06	4.98	5.70	
Dextrinoids with Crude Gliadin (7)	2.48	1.88	+0.25	1.93	1.41	1.23	1.90	1.75	0.63	0.93	1.47	0.91	1.84	0.93	1.16	
Pure Gliadin (6).....	3.61	3.64	3.82	4.22	4.41	4.12	4.32	4.48	4.88	4.13	4.25	4.18	4.22	4.05	4.54	
Pure Glutenin (8).....	4.26	3.81	4.14	5.03	3.97	5.15	4.67	4.25	4.37	5.54	4.37	4.47	6.75	5.09	5.00	
Proteids in Kneading Water (5)....	1.18	1.24	1.65	1.29	1.12	0.87	1.38	1.18	0.94	1.16	1.27	0.80	1.27	1.17	1.24	
Proteids in Starch (by difference) (11).....	1.49	0.96	1.08	10.54 +0.49	0.63	0.39	1.87	1.50	2.41	1.14	0.38	2.52	12.24 +0.59	10.31 +0.58	1.51	
Total Proteids.....	10.54	9.65	10.69	10.05	10.13	10.53	12.24	11.41	12.60	11.97	10.27	11.97	11.65	9.73	12.29	
Per cent Pure Gliadin from total proteids of flour (15).....	34.25	37.72	35.73	41.99	43.54	39.12	35.29	39.26	38.73	34.50	41.30	34.92	36.22	41.62	36.94	
Per cent Pure Glutenin from total proteids of flour (by difference).....	65.75	62.28	64.27	58.01	56.46	60.88	64.71	60.74	61.27	65.50	58.70	65.08	63.78	58.38	63.06	

The wheat crop of 1903 in the North-west was recognised as a remarkably good one, and as capable of being taken as a standard by which to judge the products of subsequent seasons. The flours from that crop which are described in this paper as belonging to the season 1903-4, gave great satisfaction to the bakers, who were able to produce from them breads of excellent quality with the greatest ease. When the flours of the next crop came on the market (1904-5) they were found to be troublesome to work, and to require delicate handling in order to the production of good bread. During doughmaking and fermentation they behaved well, the sponge being light and rising readily. But this favorable shewing did not continue when the loaves were introduced into the oven. The expansion ceased and it even seemed as if a collapse and a lessening of the porosity took place. With regard to the flours from the crop of 1905, the disadvantages of the previous seasons flours were not observed to anything like the same extent and they earned the character of being much better, and of resembling to a greater extent the flours of 1903-4, although they did not come up to the latter in excellence.

Now, if we examine the lines of figures in Table II, we find that the one which most closely corresponds to the variations in the crop characters just mentioned, is that which gives the percentage of pure gliadin from the total proteids of the flour. It will be observed that, in the case of every one of the different brands, that percentage is highest in the flours from the crop of 1904, the year in which they shewed the greatest defects for baking purposes, and also that the same percentage is lowest for the products of the pattern year of 1903. With regard to the flours of last year they generally occupy an intermediate position betwixt those of the two other seasons, although some of them shew the same proportion of the gliadin to other proteids as the flours of 1903. It is ordinarily accepted that gliadin or the alcohol soluble proteids of gluten are those to which its elasticity or adhesiveness are due, and a high percentage of these is usually supposed to indicate a flour of superior quality. According to the figures recorded in Table II, it appears, however, that the higher percentage of gliadin in the flours of 1904 was one of the causes of their defective character.

The average percentage of gliadin in the flour proteids of 1903 according to the above determinations is 36.45. If all the other proteids in the flour are regarded as glutenin then the proportion of gliadin to glutenin is as 36.45 to 63.55. But this assumption cannot be correct seeing that the water soluble proteids have not the properties of glutenin. If the water soluble proteids are deducted from the total proteids, and the proportion is calculated in the remainder of gliadin to glutenin, the

average proportion in the flours of 1903 is 41.07 to 58.93. Even this is altogether different from what has heretofore been supposed to be the most advantageous proportion for breadmaking purposes. Some modern flour chemists regard the most advantageous ratio as 65 gliadin to 35 glutenin and Prof. Snyder places it at 60 to 40. These proportions are just the reverse of those which we are inclined to regard as correct, but they are based upon determinations of the gliadin by extracting the flour direct with alcohol, without any previous removal of the water soluble proteids, and no doubt therefore including the latter. The results of the analyses of the flours of 1903 seem therefore to justify the conclusion that the most advantageous proportion of gliadin to glutenin for baking purposes is about 40 to 60, it being understood that the proteids removed with the starch in the production of the gluten are to be regarded as glutenin. When the gliadin is present in greater quantity its super-abundant elasticity and stickiness are of no advantage, and the cell walls of the bread are deficient in strength.

There are other figures in Table II worthy of consideration, and foremost among these may be mentioned the extremely variable quantities of proteids, in all probability glutenin, which accompany the starch when it is being separated in the kneading process. This quantity varies from 0. to 2.52 per cent on the original flour, and it may possibly yet afford useful indications as regards the physical character of the gluten from which it is separated.

VI—*Anchor-Ice formation from the standpoint of the Radiation Theory, together with some early memoirs on Ground-Ice.*

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(Read May 23, 1906.)

The form of ice which has attracted the most attention of all the forms to be met with in Nature is that known in this country as Anchor Ice. As its name implies it is ice which is found attached or anchored to the bottom of a river or stream. It seems to have been observed in nearly all countries where river ice is formed and goes by the name of ground-ice, bottom-ice, ground-gru, a name given it by the inhabitants of Aberdeenshire, and lappered-ice by the common people of the South of Scotland, who apply the epithet to the natural coagulation of milk. In France it goes by the name of *glace-du-fond*, and in Germany as Grund-eis. The French-Canadian name for it is *moutonne* ice, from its resemblance to the white backs of sheep at rest.

The phenomenon of ice forming on the bottom of rivers has been known for a very long time, and although the majority of the early philosophers of France denied its existence, it was perfectly well known to every peasant.

In 1788 M. Beaun wrote several papers to establish the existence of ground-ice from his personal observations. He reports that the fishermen on the Elbe used to find the baskets which they let down into the river for the purpose of catching eels, were often, when brought up to the surface, incrustated with ice. Anchors used for mooring their boats when lost during the summer, frequently appeared in the following winter, being raised by the mass of ice which had formed about them. Their signal buoys sometimes became displaced from the raising of the large stones by the ground-ice and caused great inconvenience.

M. Desmarest, a member of the French Academy of Sciences, was among the first of the scientists to make observations on the formation of ground ice. He reports having observed flakes of ice, formed at the base of running streams, increase in thickness five or six inches in a single night.

In "Picturesque Views of the River Thames," published in 1792, Ireland speaks of the ground-ice of that river, remarking, "The watermen frequently meet the ice meers, or cakes of ice, in their rise, and

sometimes in the underside enclosing stones and gravel brought up by them *ad imo*."

In February of 1827, M. Hugi, President of the Society of Natural History at Soleure, reports that while standing on the bridge over the Aar, when the river was clear of ice, he observed large ice tables continually rising from the bottom, in a vertical direction and with such buoyancy as to rise considerably above the surface, when they immediately sank into a horizontal position and floated down stream.

This is in almost perfect accord with what takes place in our northern rivers during the daytime under a bright sun or during mild rainy weather.

In 1835 the great philosopher, M. Arago, published an interesting paper on the subject in the *Annuaire du Bureau des Longitudes*. He mentions the following rivers where ground-ice was met with and the date of such observation. In the Thames, by Hales, in 1730; in the river Déonie, France, in 1780; in the Elbe, by Beaun, in 1788; in the Teine, Herefordshire, in 1816; in the Rhine at Strasburg, in 1829; and in the Seine, in 1830.

In the *Edinburgh Philosophical Journal* for 1834 there is an interesting paper on "Observations on Ground Ice," by the Rev. Mr. Eisdale, who attempts to explain the phenomenon on an original theory of his own. He states that the ice commences on the bottom and extends upwards to the surface, and is produced only in the most rapid and most rugged streams.

The Rev. Dr. Farquharson published two important papers on Ground-ice in the *Philosophical Transactions* of 1835 and 1841. His observations were made of the ice in the rivers Don and Leochal, in Aberdeenshire. The conclusions he arrived at are that ground-ice is formed by radiation, and he endeavoured to substantiate his reasoning upon the principle of the formation of dew.

The first use of the term *anchor-ice* which I have been able to find is in the *Encyclopædia Americana*, published by Carey and Lea of Philadelphia in 1831. Under the article on ice we find the author, after referring to ground-ice, states, that "a kind called anchor-ice appears to be formed at the bottom or at least under the surface of rapid rivers, perhaps owing to the comparatively slow motion of the water at the bottom of a stream."

The term anchor-ice, applied to ice anchored at the bottom, seems thus to have originated in America. Much confusion exists in regard to the relation of this ice to frazil-ice, brought about partly by a confusion of terms, and partly from the fact that immense quantities of frazil-ice become attached to the bottom by freezing to the

layers of ice already formed there. The term anchor-ice we shall use to designate all ice found attached to the bottom irrespective of its nature of formation. Thus, frazil becomes anchor-ice when it attaches itself to the bottom. The birth of frazil is in the water itself by surface cooling through wind or rapid agitation. Anchor-ice may form *in situ* on the bed of a river, and may grow by attaching to itself frazil crystals brought down by currents or by the slower process of radiation.

In the report of the Montreal Flood Commission we have the terminology clearly defined and we cannot too strongly emphasize the importance of adhering to this distinction for clearness of expression. Thus, referring to the important report published by the Commission as early as 1888, we find the following:—"Frazil, as distinguished from Anchor-ice, is formed over the unfrozen surface above and below Lachine Rapids (St. Lawrence River, at Montreal) between Prescott and tide water, and wherever there is sufficient current or wind agitation to prevent the formation of bordage ice."

We find that as early as 1810 writers of that time drew a distinction between three kinds of river ice, if we may judge from an early edition of the *Encyclopædia Britannica* published at that date. Under the article on Ice, we find the following: "Ice forms generally on the surface of the water; but this, too, like the crystallization, may be varied by an alteration in the circumstances." In Germany, particularly the northern parts of the country, it has been observed that there are three kinds of ice. 1. That which forms on the surface. 2. Another kind formed in the middle of the water, resembling nuclei or small hail. 3. Ground-ice, which is produced at the bottom, especially where there is any fibrous substance to which it may adhere. This is full of cells like a wasp's nest, but less regular; and performs many strange effects in bringing up very heavy bodies from the bottom, by means of its inferiority in specific gravity to the water in which it is formed. The ice which forms in the middle of the water rises to the top, and there unites into large masses; but the formation both of this and the ground-ice takes place only in violent and sudden colds, where the water is shallow and the surface is disturbed in such a manner that the congelation cannot take place. The ground-ice is very destructive to dykes and other aquatic works. In the more temperate European climates these kinds of ice are not met with."

These three kinds of ice are what we term sheet, frazil and anchor-ice.¹

¹ A full discussion of the formation of the three kinds of ice will be found in my "Ice Formation, with special reference to Anchor-Ice and Frazil," Wiley & Sons, New York, 1906.

The worst effects which are met with in engineering works are from frazil crystals formed during extreme weather when anchor-ice is growing rapidly by the freezing down of the crystals and not, as is sometimes supposed, when moderate weather occurs and these huge lumps become loose and rise to the surface. Thus, it is often thought that it is useless distinguishing frazil from anchor ice unless it were possible to tell them apart at the foot of a stretch of open water where they accumulate at the edge of the barrier ice. They are certainly both ice; but the conditions under which anchor ice will form are not the same as for frazil and *vice versa*. Methods of construction to obviate the one will not meet the exigencies of the other. So long as the ice problem lasts we shall find circumstances conducive to the formation of either one or the other or both. We should, therefore, keep clearly in our mind how each is likely to be formed in order to be prepared to distinguish the conditions most likely to favour the growth of either. In a shallow, smooth flowing river, we are more likely to have anchor-ice formed in excess, whereas in a deep and turbulent stream we are likely to have more frazil. It is hardly likely, however, that there will be a great difference in the amount of frazil formed; it will probably be that more or less anchor-ice will appear in proportion. In a river 40 or 50 feet deep anchor-ice is almost unknown, although large quantities of frazil are met with.

Everything seems to point to radiation as the prime cause of anchor-ice, and it is a great question whether it would form at all, or except in exposed or exceedingly shallow rapids unless the first coating of ice was placed over the rocks by the radiation of heat.

Consider the circumstances: the water flowing over the rocks at the bottom of a river is always very close to the freezing point. The deviations from the freezing point, as I have shown elsewhere in these Transactions (1896, 1897), are seldom as great as $1/100^{\circ}$ Fahr. The bottom is continually being warmed to a small amount by the conduction of heat from the earth. It is therefore difficult to see how ice can form on it by heat loss directly to the water. The utmost frost that can be present is only 1-100 of a degree, which would form but a minute layer. Unlike open ground subjected to extremely cold air, the bed of a river cannot become frozen to any extent unless in very shallow streams.

The radiation of heat from the bed of a river must go on all the time to the colder air above and to the much colder space. During the daytime, under a clear sky, we have the sun's heat radiated down through the water and offsetting the cooling effect produced by the space radiation, and on a cloudy day, we have the heat rays reflected

back again. On a clear night in winter, with little or no motion in the air, the circumstances are entirely conducive to excessive radiation. We know from what knowledge we have of the radiation from hot bodies that only a small proportion of the heat can penetrate a layer of water. Hence the heat of the sun is mostly absorbed in the first few feet of water. Only a small proportion of the rays ever reach the bottom. On the other hand, the radiation from the bottom is quite different and consists of long rays which we have every reason to believe penetrate the water much more easily. It might at first sight appear that there was a much larger amount of heat radiated into the river by the sun, whose temperature is so high, than is radiated out of the river into space. This is apparently quite true, and but for the absorption by the water of the greater part of the sun's heat, and the consequent lessening of the heat which actually reaches the bottom, it is a question whether anchor-ice would ever form. Very little is known in regard to cold body radiation, and it is not impossible that little or no heat is absorbed by the water, if radiated from the bottom into space at the absolute zero.

The influence of the sun is everywhere observed in the formation of both frazil and anchor-ice. In the former by warming the water and preventing it from becoming undercooled, and in the latter by loosening the masses of anchor-ice and causing them to rise. Frazil is never observed to have a bad effect under a strong sun.

That portion of the heat from the sun, the long waves, that can penetrate the water, is effective in melting off the hold which the anchor-ice has on the bed of a river. A common sight in the early morning, after a cold, clear night, when the sun rises, is the appearance of masses of anchor-ice. These rise and float down with the current in great quantity. Boatmen are very careful when crossing a river never to go when these masses are rising, from the danger of being surrounded and caught in a mass of anchor-ice and carried down by the stream helpless into the rapids.

If we sum up the various facts of common observation in connection with anchor-ice, we see that everything points to radiation as the prime cause. Thus we find that a bridge or cover prevents the ice forming underneath. Such a cover would act as a check to radiation and reflect the heat waves back again to the bottom. Anchor-ice rarely forms under a layer of surface ice. It forms on dark rocks more readily than light ones, which is in accord with what we know in regard to the more copious radiation of heat from dark surfaces. Anchor-ice never forms under a cloudy sky either by day or night, no matter how severe the weather, but it forms very rapidly under a

clear sky at night. Anchor-ice is readily melted off under a bright sun. It seems highly probable then that radiation of heat supplies the necessary cooling to the bottom of a river to establish the first layers of ice, after which the growth or building up of the ice is aided by the entangling and freezing of frazil crystals always present in the water.

The growth of anchor-ice is exceedingly beautiful, taking place in arborescent forms, resembling bushy weeds. So hard does it become and thick that it is often very difficult to thrust a sounding rod through it. It is very granular in structure, as is shown by an examination of the masses which rise to the surface. Through clear water the ice looks weed-like, with long tentacles rising up out of the mass. It often has immense power in lifting rocks and boulders, and many of these are carried far down stream attached to irregular masses of ice. The spongy character of adhering frazil crystals and anchor-ice causes them to accumulate slime and infusorial growths from the water. A very characteristic colour of these masses is brown. When melted in a vessel the slime settles to the bottom, when it is seen to be of a very fine structure.

APPENDIX.

SOME EARLY MEMOIRS ON GROUND-ICE.

During my search through the literature on natural ice formation it was my good fortune recently to discover four important and interesting papers written many years ago, at a time when scientists apparently first turned their attention to the formation of ice on the bottom of a river. I consider these papers are of such importance on account of the mass of observations they contain that I reproduce them here in full by the kind permission of the Publication Committee of the Royal Society. The value of these papers will be at once apparent to anyone reading them, and the fact that they have remained practically unnoticed for upwards of seventy-five years renders them all the more interesting. I have never seen them referred to by modern writers on the subject of river-ice formation, and it was only by the merest chance that it was my good fortune to discover them. The volumes in which they appear, *i.e.*, the *Edinburgh New Philosophical Journal*, and the early Transactions of the Royal Society of London, are now difficult to obtain, and in placing them on record here, I feel confident that our knowledge of the causes underlying the formation of anchor-ice will be vastly increased.

ON THE GROUND-ICE OR THE PIECES OF FLOATING ICE OBSERVED IN
RIVERS DURING WINTER.

BY M. ARAGO.

From Edinburgh New Philosophical Journal, Vol. 15, p. 123 (1833).

The severe winter of 1829-30 has attracted the attention of natural philosophers to the phenomena of congelation in *running waters*. They have examined how, and in what manner, immense quantities of ice are formed which some rivers carry down to the sea, and which, on being piled up against the arches of a bridge, often cause fatal accidents. I confess that, in a theoretical point of view, the question does not yet seem, in my opinion, to be exhausted. Is it not a strong reason, then, for my presenting as complete an analysis as possible of the observations to which it has given rise? For want of a definite solution of so curious a problem, I shall at least have placed before the eyes of meteorologists a complete tabular view of all the data with which it is indispensable that the explanation shall agree.

Every one knows that in a lake, a pond, in every sheet of stagnant water, congelation proceeds from the exterior to the interior. It is the upper part of the surface of the water which is primarily affected. The thickness of the ice afterwards increases in proceeding from above downwards.

Is this the case with *running waters*? Natural philosophers are of this opinion. On the other hand, millers, fishermen, and watermen, maintain that the masses of ice with which rivers are crowded in the winter season, proceed from the bottom. They pretend that they have seen them rise, and have often borne them up with their hooks. They say, in order to strengthen their opinion, that the inferior surfaces of large flakes of ice are impregnated with mud; that it is encrusted with gravel; that, in short, it bears the most unequivocal marks of the ground on which it rested; that, in Germany, the sailors have a peculiar and characteristic term to designate floating ice which they call *grundeis*, i.e., ground-ice. Such arguments make little impression on prejudiced minds. It would require nothing less than the evidence of many experienced philosophers to cause a belief in the reality of a phenomenon which seems directly opposed to the laws of the propagation of heat. But it is so. This evidence is not wanting; and if the phenomenon of ice in the bottom of water has only appeared recently as an established fact in treatises on physics and meteorology, the reason is, because their authors generally copy from each other,

because everyone neglects what his predecessor neglected, and because academical collections, in which many treasures remain concealed, are very seldom consulted.

In 1730, at an atmospherical temperature of -9° centigr. ($15^{\circ}.8$ Fahr.), Hales saw at Teddington, the surface of the Thames, near the banks, covered with a layer of ice one-third of an inch in thickness. There was also at the same time a second layer below, of greater thickness, which followed the depth of the river, as it adhered to the bottom. This sheet was united to the upper one even on the water-side; but it was gradually separated in proportion, as, in proceeding into the river, the depth of water increased. It was not so solid as the first, and was mixed with sand, and even stones, which the flakes sometimes carry with them in their movement upwards.

This observation is defective, inasmuch as it was made too near the bank. Those who do not know how imperfectly every kind of soil transmits heat, might suppose that the cold was communicated from the dry ground of the bank to that which formed the bed of the river by means of conductivity. It is unnecessary to discuss this difficult point, as it has no connexion with many of the cases which are about to occupy our attention.

It is really surprising that those writers who have lately considered the subject of floating ice in a historical point of view, have not alluded to some observations which were made in France a good many years ago.

At the close of December, 1780, the temperature was very suddenly decreased in the southern parts of France by a very strong northerly wind. The thermometer sunk to 8° or 7° centigr. below zero. Desmarest, member of the Academie des Sciences, who, at that time, happened to be at Annonay, saw the bed of the Dôme covered with spongy ice. The frost commenced at first on the margin of the river, where there was a depth of water to the extent of two or three feet. The cold continuing, the ice soon shewed itself in the deepest parts.

In places where the water flowed over the *bare rocks*, Desmarest saw no vestige of ice. On the contrary, it was rapidly formed in great abundance, especially where there was any quantity of gravel; in some parts it was two feet thick.

According to Desmarest, "it was from the lower part which touched the bottom, that the flakes of ice successively increased . . . The ice already formed was continually raised up by the expansive force of that which was in the act of formation . . . In watching its motion, I have seen," said he, "that certain flakes of the ice were raised up five or six inches in a single night. Some of them

were, in consequence of the daily and tolerably equal *under-additions*, believed to form, in this manner, islands of ice, which appeared above the running water."

No one has hitherto corroborated this mode of increase of ice under water. It is to be regretted that Desmarest did not explain the nature of the observation which induced him to come to such a singular result. Had he, for example, deposited on the flakes of the ice at the bottom objects which always remained visible, while, in rising, all the twenty-four hours, the flakes actually approached the surface of the water, it certainly would have been worth while giving an explanation.

When, in consequence of a cloudy sky, the atmospherical temperature experiences little variation throughout the day and night, the ice at the bottom of the water, according to Desmarest, uniformly increases every twenty-four hours. On the contrary, when the sun shews itself, the ice does not increase during the day. The different layers which are produced during the night after an interval of five or six hours of repose, form distinct beds, which are easily disunited. The current then detaches each layer of ice from the lower one, to which it adheres but feebly, and the river begins to carry it along.

M. Beaun, a bailiff at Weld Wilhelmsbourg, on the Elbe, published many dissertations in 1788, in which the existence of ice on the bottom of a river is established, either by his own observations or the unanimous declarations of fishermen, procured after a most anxious investigation.

The fishermen asserted that, during the cold days in autumn, long before the appearance of ice on the surface of the river, the nets which were at the bottom of the water were covered with such a quantity of grundeis that they drew them up with great difficulty; that the baskets which were used for catching eels also often on being brought to the surface were encrusted with ice; that anchors which had been lost during the summer again appeared in the following winter, being raised up by the ascending force of the ice at the bottom which had covered them; that this ice raised up the large stones to which the buoys were attached by chains, and occasioned the greatest inconvenience by displacing these useful signals, etc., etc.

These various observations were confirmed by Beaun on his own authority. He says that he discovered, by means of experiment, that hemp, wool, hair, the boiled hair of horses, moss in particular and the bark of trees, are bodies, which, on being placed at the bottom of water, are very speedily covered with ice. He declares that various metals do not possess this property in the same degree. According to him, tin occupies the first rank,—iron the last.

Mr. Knight, the celebrated botanist, has related an observation in the 106th volume of the Philosophical Transactions, which is the more valuable, as it seems in some respects to afford a clue to the secret of the formation of ice on the bottom of rivers.

"In a morning which succeeded an intensely cold night, the stones in the rocky bed of the river appeared to be covered with frozen matter, which reflected a kind of silvery whiteness, and which, upon examination, I found to consist of numerous frozen spicula crossing each other in every direction, as in snow, but not having anywhere, except very near the shore, assumed the state of firm compact ice. The river was not at this time frozen over in any part; but the temperature of the water was obviously at the freezing point, for small pieces of ice had everywhere formed upon it in its more stagnant parts near the shores; and upon a mill-pond, just above the shallow streams (in the bottom of which I had observed the ice), I noticed millions of little frozen spicula floating upon the water. At the end of this mill-pond the water fell over a low weir and entered a narrow channel, where its course was obstructed by points of rock and large stones. By these, numerous eddies and gyrations were occasioned, which apparently drew the floating spicula under water; and I found the frozen matter to accumulate much more abundantly upon such parts of the stones as stood opposed to the current, where that was not very rapid below the little falls or very rapid parts of the river. I have reason to believe that it would have accumulated in very large quantities if the weather had continued sufficiently cold; for I had been informed on good evidence, that, some years before, the whole bed of the river in the part above mentioned had been covered over with a thick coat of ice.

"On some large stones near the shore, of which parts were out of the water, and upon pieces of native rock, under similar circumstances, the ice beneath the water had acquired a firmer texture, but appeared from its whiteness to have been first formed of congregated spicula, and to have subsequently frozen into a firm mass, owing to the lower extremity of the stone or rock. Ice of this kind extended in a few places eighteen inches from the shore, and lay three or four inches below the level of the surface of the water, and did not dissolve so rapidly as that which was deposited upon stones more distant from the shores."

In the 11th of February, 1816, the engineers of bridges and roads residing at Strasburg, saw above the bridge of Kehl that many parts of the channel of the Rhine were covered with ice. About ten o'clock a.m. this ice became loose, rose to the surface, and floated.

The thermometer in the open air stood at -12° centigr. The water in the river at every depth was at zero cent. The ice at the bottom was only formed in places, however, where there were stones and angular stuff. It was spongy, and formed of icy spicula.

The overseers of the bridge stated that it never appeared on the surface until after 10 or 11 o'clock in the morning.

The canal of Saint-Alban conveys the waters of the Birse through the town of Bale. It is very limpid and flows with great rapidity. During the winter of 1823, Professor Merian carefully examined the bed of the canal, which, in general, is covered with pebbles, and saw that wherever the bottom exhibited any projection, there was a small piece of ice, which might have been supposed, at a distance, to be a reuniting of tufts of cotton. This ice became disengaged from the bottom from time to time, and floated on the surface. It had all the appearance of the *grund-eis* of the German watermen.

M. Hugli, president of the Société d'Histoire Naturelle de Soleure, is the philosopher who, in my opinion, has *seen* the phenomenon of the formation of ice at the bottom of water displayed on the greatest scale. His first observations were made in 1827.

From the 2nd to the 3rd February of that year, the river Aar, at Soleure, was breaking up the ice; on the 15th it was completely open. It flowed slowly on the 16th, and the water was perfectly pure. On this day, in consequence of a westerly wind, a multitude of large icy tables were continually rising from the bottom about 60 or 70 feet below the bridge, and over a surface of upwards of 450 square feet. I ought to add, as this circumstance confirms what Hales was told by the fishermen of the Thames, that the great proportion of the flakes of ice mounted vertically, till 5 or 6 decimetres above the surface of the water, and after remaining a few minutes in this position, they sunk down, and floated horizontally.

After a certain time, the flakes of ice became more scarce; but they had increased to such an extent, that many, though almost vertically raised above the water, still rested in the bed of the river on one of their sides, and in which position they remained stationary for a long time. The phenomenon lasted for about a couple of hours.

Below the bridge, the Aar flows with rapidity over an inclined channel of 20 to 30 degrees, and in many places is quite stony. Beyond the place where the flakes of ice arose, the water, already more tranquil, always exhibited a sort of eddy.

The temperature of the air was $-5^{\circ}.7$ centigr.; near the water $-4^{\circ}.9$; close to the surface of the river, $+2^{\circ}.1$. The water near the arches, where there was no ice, was at $+3^{\circ}.0$; at the bottom, where ice ascended, $0^{\circ}.0$.

There is one circumstance which lessens the importance of these observations as to the temperature; it is not established that the ice at the bottom of the river on the 16th February was formed on that day, and these ices might again cover the bed of the river for many days afterwards.

The second series of the observations of M. Hugi were made in the month of February, 1829.

On the 11th of this month, the Aar near Soleure was quite free from ice. For many days the temperature of the atmosphere was from $+4^{\circ}$ to $+6^{\circ}$ centigr. During the night of the 11th-12th, it suddenly fell to -14° centigr. In the 12th at sunrise, the river began to exhibit numerous floating pieces of ice. We must by no means omit to add, that the water, either near the banks, or in the shady places where it was perfectly calm, as yet bore no trace of congelation on its surface. It, therefore could not be said that the floating masses were detached from the banks. It would have been as unfounded to have supposed that they had proceeded from any large sheet of ice situated farther up the river, as at Altrey, a league and a half above Soleure, the river hardly exhibited any ice. Besides, flakes of ice commenced soon to rise up above the bridge, in the place where they had been seen in 1827. Towards mid-day, islands of ice were seen forming in the centre of the river. On the 13th February these were 23 in number. The largest was upwards of 200 feet in diameter. They were surrounded with open water, resisted a current which almost ran at a rate of 200 feet in a minute, and extended over a space of one-eighth of a league. M. Hugi visited them in a small boat. He landed, examined them in every direction, and discovered that there was a layer of compact ice on their surface of 5 or 10 centimetres in thickness, resting on a mass having the shape of a cone reversed, of a vertical height of 3 or 4 metres, and fixed to the bottom of the bed of the river. These cones consisted of half-melted ice, gelatinous, and very like *the spawn of a frog*. It was softer at the bottom than at the top, and was easily pierced in all directions with poles. Exposed to the open air, the substance of the cones became quickly granulated like the ice that is formed at the bottom of rivers.

When these observations were being made, the temperature of *the air*, at 9 metres above the Aar, was, $-11^{\circ}.2$ centigr.; at 1^m.3, $-9^{\circ}.4$. That of the water, at 5 centimetres deep, $0^{\circ}.0$; at 1^m.8, $+1^{\circ}.0$; at 0^m.5 from the bottom, $+1^{\circ}.5$; at the bottom, $+2^{\circ}.4$; at 1^m. in the ground, $+8^{\circ}.0$.

These determinations of the temperature of the water were obtained in a part of the river which had no ice at the bottom.

M. Fargeau, a distinguished professor of natural philosophy in Strasbourgh, has made some observations on the Rhine, which have been communicated to the Academy. Notwithstanding what we have read, they are very deserving of notice.

On the 25th of January, 1829, at 7 o'clock a.m., the temperature of the air, near the bridge at Kehl, was at $13^{\circ}.71$ centigr. At the same moment, in that part of the Rhine which, owing to the situation of its sand-banks, formed, on the French side, a sort of lake *without currents*, the water of which was at *zero*, but at the depth of $2/2$ [?] metre it was $+4^{\circ}.4$. This place had only a few plates of ice near the banks.

Beyond the banks of sand, in a little creek where the shallow water was *contiguous to a very rapid current*, all the pebbles seemed covered with a sort of transparent mass of from 3 to 4 centimetres in thickness, and which, on examination, was found to consist of icy spicula crossing each other in every direction. In this creek the thermometer stood at *zero cent.* both at the surface and at the bottom of the water. It was the same even in the most rapid part of the current. There was also seen, either in the channel of the Rhine, or on some pieces of wood on the side opposite to the current, at a depth of 2 metres, large masses of spongy ice, into which the pole of a waterman entered with ease. This ice, on being borne to the surface of the water, was found closely to resemble the innumerable flakes which were at that time floating on the surface. M. Fargeau states, that he saw ice on many occasions with his *own eyes*, in the greater Rhine, separate from the bottom, and rise to the surface.

M. Fargeau has added an important observation to his own remarks, which was communicated to him, and from whence the result is derived, that the nature of the bed of the river has the same influence on the phenomena of congelation in small and in large currents of water. In the Vosges, a superintendent of forges, informed him, that, to prevent the formation of ice at the bottom of the rivulet which supplied his establishment, he was obliged once a year to remove the stones and other foreign bodies with which the channel became accidentally covered.

In the beginning of February, 1830, M. Duhamel, on breaking the ice which covered the surface of the Seine, a short way below the bridge at Grenelle, about 10 feet from the banks, found a layer of continuous ice 4 centimetres thick. He even procured many fragments. At this spot the water was upwards of one yard deep. At every depth the thermometer stood at zero centigr. The current was tolerably rapid.

The experiment of M. Duhamel had this defect, like that of Hales formerly mentioned, of having been made too close to the bank. I

could not, however, omit quoting it, as I am not aware of any observation to be found elsewhere by a man of science respecting the congelation at the bottom of the Seine.

It has been mentioned already, that natural philosophers did not believe in the formation of floating ice at the bottom of water; they ought, therefore, not to expect that any thing very important will be found in the sketch I am about to present of the theoretical speculations to which this theory has given rise.

Sailors for the most part believe that the flakes of ice are formed at night on the bottom of rivers, by the action of the moon, and that it is the sun which attracts them to the surface on the following day. Popular prejudices are generally grounded on some imperfect observation. By recollecting what we said concerning the red moon we shall easily discover how the strange notion of which I have spoken arose.

The theory of the sailors was not succeeded by an explication in any degree better. It was said that heat arises from the rapid movement of the parts of bodies. The running water flows less rapidly at the bottom than at the top, the maximum of temperature is, of course, found at the surface; it is at the bottom, where there is the least agitation, that the congelation ought to begin. To complete this theory, the ascension of the flakes of ice was attributed to the elasticity which the air dissolved in the water resumes when it disengages itself during the process of congelation, and to the formation, in the midst of the icy mass, of bubbles of considerable size.

In 1742, when this strange theory saw the light (*Observations sur les Ecrits modernes*, t. xxxi.), the thermometer was in the hand of every person, and, of course, it could have been easily ascertained that, during a hard frost, river water is in general colder at the surface than at the bottom. But, as Montaigne says, even in the facts which are laid before them, men willingly amuse themselves in seeking for reasons rather than truth; they abandon things and fly to causes.

To reconcile the theoretical objection which Nollet has made to the popular opinion respecting ice at the bottom of water, with the observations which incontestibly establish that the greater part of the flakes which have been broken up have been immersed for a longer or shorter period, and that their inferior surface rests on a muddy bottom, it has been thought that the origin will be found in the small streams which run into large rivers. There, it is said, the water being shallow, the ice should soon find itself in contact with the ground or mud with which the bed is covered. As to the flakes of ice which rise beneath the water, which sailors bring up with their hooks from a depth of some feet, their existence is explained by remarking that, after a sharp frost followed by the commencement of a thaw, there

is sometimes a great increase, to which a new frost succeeds, so that there is in the river, but especially near the banks, *two layers of ice superimposed at a distance*; the one at the height of the first level of the water, the other at the height which this level has attained on the rise of the water. This theory, which refers to a peculiar case, does not explain, in any point of view, the observations just made, and in which natural philosophers have *actually* seen ice formed on the surface of pebbles placed at the bottom of the water in the beds of certain rivers.

We now come to Mr. McKeever, who, confining himself closely to the most subtle principles of the theory of heat, has not, on this account, been more fortunate than his predecessors.

According to this author, the rocks, stones, and gravel which generally cover the bottom of rivers, have powers of radiation superior to those of mud, perhaps on account of their peculiar nature, but chiefly because they have rough surfaces. Thus rocks, in large or small masses, will become much cooler in consequence of radiation: when the atmospheric temperature is very low, they will, of course, freeze the water which touches them.

It is unnecessary to examine here, whether heat radiates through a thick layer of water, as Mr. McKeever supposes, as the most simple observation is sufficient to overthrow it.

Where is the person who has not observed, that the strong radiation which the Irish philosopher admits, would be more plainly manifested, or as completely, in still water than in running water; but no one has seen a piece of still water frozen at the bottom?

Let us throw aside all these absurd explanations, and, for want of better, analyze perspicuously the physical condition of the question.

If liquids of different densities are thrown into a vessel, the heavy will sink to the bottom, the light keep at the top.

This principle of hydrostatics is general. It applies as well to liquids possessing different chemical properties, as to portion of one and the same liquid whose densities are dissimilar, in consequence of inequalities in the temperature.

Liquids, like all other bodies, solid or gaseous, increase in density as their temperature diminishes.

Water alone, in a *certain small extent of the thermometric scale*, presents a singular exception to this rule. Suppose water is taken at $+10^{\circ}$ centigr. and gradually cooled, at 9° we shall find it denser than at 10° , at 8° more than 9° , at 7° more than 8° , and so on till 4° ; at this point condensation [?] will cease. In going from 4° to 3° , for example, there is a manifest diminution of density. This dim-

inution will go on till the temperature falls from 3 to 2, from 2 to 1, and from 1 to zero. To conclude, water has a maximum of density, which does not coincide with its term of congelation. At 4° above zero is the maximum of density.

There is nothing so simple as to point out in what manner the congelation of stagnant water takes place.

Let us suppose, as is always the case, that at the moment when the wind blowing from the north produces ice, the water throughout to be at $+10^{\circ}$. The cooling of the liquid, by coming in contact with the glacial air, will be affected from the exterior to the interior. The surface which, hypothetically speaking, was at 10° will soon be at 9° ; but at 9° the water will possess more density than at 10° ; then, in consequence of the principle of hydrostatics formerly mentioned, it will sink to the bottom of the mass, and be replaced by a layer not yet cooled, whose temperature is 10° . That, in its turn, will be affected like the first layer, and so on of the rest. In a greater or less time the whole mass will then be at $+9^{\circ}$.

Water at $+9^{\circ}$ will become cool in the same way as at 10° by consecutive layers. Each in its turn, on coming to the surface, will lose one degree of temperature. The same phenomenon will reappear, with similar circumstances, at 8° , 7° , 6° , and 5° ; but, on sinking to 4° , every thing will be changed.

At $+4^{\circ}$ ($39^{\circ}.2$ Fabr.) water will actually reach its maximum of density. Should the action of the atmosphere take away a degree of heat from the superficial layer, or descend to 3° , the layer will be *less dense* than the portion of fluid which it covers; it will never sink into it. An additional diminution in the heat will not cause it to sink more, as water at $+2^{\circ}$ is lighter than at $+3^{\circ}$, etc.

It is quite obvious, however, that the layer in question, by remaining always on the surface, incessantly exposed to the cooling influence of the atmosphere, will at length lose the first 4° of its heat. It will end by falling to zero, and freezing.

The superficial sheet of ice, however singular the phenomenon may be, is then found resting on a liquid mass, whose temperature, at least at the bottom, is 4° above zero.

The congelation of *stagnant water* could not evidently take place in any other manner. I repeat, that no person has ever seen the formation of ice beginning at the bottom of a lake or pond.

Let us briefly examine the modifications which the motion of the liquid should produce.

The effect of this motion, when it is rather rapid, when it forms eddies, and flows over a rocky or unequal channel, is perpetually to

mix all the layers. The hydrostatic order on which we have insisted so much is overthrown. The water, then, which is lightest does not always float on the surface. The currents are precipitated into the general mass, which is thereby cooled, and whose temperature soon becomes equal throughout.

To repeat, in a deep mass of stagnant water, the temperature of the bottom can never descend below $+4^{\circ}$ cent. When this mass is in a state of agitation, the surface, the middle, and the bottom, may be found at zero simultaneously.

We have only now to examine, why, when this uniformity of temperature exists, and when the entire liquid mass is at zero, that congelation commences at the bottom, and not at the surface.

But where is the person who does not know, that to produce a speedy formation of crystals in a saline solution, it is merely necessary to introduce a pointed body, or an unequal surface into it; that it is around the asperities of such a body that crystals originate and are promptly increased? Be it so, every one may be assured that this is the case with crystals of ice; that if the mud in which the congelation occurs presents a rent or projection, or solution of continuity of any kind, it will become as so many centres, around which the filaments of frozen water will prefer to arrange themselves.

But is not what we have said exactly the history of the freezing of rivers? This cannot be doubted, if we recollect, that it never takes place in the channel, unless where there are rocks, stones, pebbles, pieces of wood, herbs, etc.

There is another circumstance which seems to have a certain share in this phenomenon, viz., the motion of the water. At the surface this motion is very rapid and irregular; it ought, of course, to put a stop to the symmetrical grouping of needles; to that polar arrangement without which crystals, whatever be their nature, can neither acquire regularity of form, nor solidity; it should, of course, frequently break the crystalline groups, even in their rudimentary state.

This motion, which is the principal obstacle to crystallization, if it exists at the bottom as well as the surface of the water, is at least greatly diminished at the former. It may be supposed, therefore, that its action will merely oppose the formation of regular or compact ice, but will not eventually prevent a multitude of little filaments becoming irregularly blended, and thus produce that kind of spongy ice through which M. Hugi so easily drove the oars of his boat.

Having proceeded thus far, the reader may ask why I did not present what preceded, as a complete explanation of the formation of

the grund-eis of Germany, of the *glacés de fond* of our sailors. This is my answer:

We have no observations which *prove* that this kind of ice is seen, until the temperature of the whole of the water is at zero. It is not certain that the little icy particles floating on the water, mentioned by Mr. Knight, and which may have acquired, by coming into contact with the air, at least on their upper surface, a temperature considerably below zero, do not play an important part in this phenomenon, which I have entirely overlooked; that, viz., of cooling the stones covering the bed of the river, when dragged thither by currents. Is it not possible that these floating filaments were the principal elements of the spongy ice which was afterwards to be formed?

Our theory does not explain in what manner this ice, once formed, only increases in a downward direction. If the remark of Desmarest be correct, there is something wanting to complete it.

During the congelation of the bottom of the Aar, at the place where the ice is formed, M. Hugi immersed pitchers filled with hot and cold water. The *first*, he says, on being brought up, was covered with a layer of ice of one inch thick, the other had no marks of congelation. Bullets covered with cloth, warm as well as cold, afforded similar results.

These remarkable experiments cannot be kept out of view. They ought to be repeated in a variety of ways: we should be sure whether these two bodies, on being immersed, do not differ but in temperature; that their surfaces are equally polished; and if, after all the minute precautions with which an able philosopher is sure to avail himself, it be found that the body, *originally hot at the moment of immersion*, is covered, as we are assured by M. Hugi, with more ice than the cold one, it will, perhaps, be necessary to attribute this singular phenomenon to the internal movement of the liquid; to currents which, being caused at first by the presence of a hot body, still continued after it became cold; to currents which incessantly continued to throw over this cold body filaments frozen on the surface.

Before coming to the conclusion, that the question which we have been discussing is completely solved, it would be necessary to subject the texture of the ices at the bottom to additional experiments; we must ascertain accurately whether the vesicular cavities, which traverse it in every direction, contain any air,—or if they are completely empty,—for this circumstance is very necessary, in order to enlighten us as to the place where they originate.

I am expatiating, however, beyond my plan. I at first merely wished to examine, whether the floating ice was produced at the bottom

or the surface of a river. This question can no longer be doubted. The theory is far from being so far advanced. I have pointed out the chasms which it still exhibits. If the recital of these cases can in any way contribute towards their being speedily filled up, I shall be amply recompensed for my trouble.

OBSERVATIONS ON GROUND-ICE.

By the REV. MR. EISDALE.

(Read before the Philosophical Society at Perth, on the 28th December, 1831, and published in the Edinburgh New Philosophical Journal, Vol. 17. p. 167. (1834.)

On the 28th of December, 1831, I read a paper at the meeting of this Society, directing the attention of the members to a particular kind of ice, which seems to be formed in direct opposition to the ordinary laws of congelation. The ice to which I allude commences at the bottom of the water, and extends upwards to the surface, and it is produced only in the most rapid and most rugged streams. This is exactly the reverse of the usual process of congelation, which takes place in stagnant water, commencing at the sides of the river or pond, and gradually extending over the surface; when it thickens downwards towards the bottom, and if the frost is sufficiently intense, converts the whole water into a solid mass of ice. The phenomenon did not seem to have attracted any attention in this quarter; and the facts which I stated, and the speculations which I advanced, seemed to excite some surprise: the ice in question, however, is perfectly familiar to every person in the country, though I never had seen any attempt to account for its formation, and had long puzzled myself in vain to form any plausible theory on the subject. I was not ashamed to confess this at the time, and I expressly declared that the theory which I proposed was intended to elicit, rather than impart, information, and especially to direct attention to the *alleged* facts which had been communicated to me, and on which I founded my explanation of the process.

This kind of ice is well known in all northern climates, from its annoying effects in obstructing all works which are carried on by the impelling power of water. When ice collects on the surface of mill-leads it is easily managed; it needs only to be broken and floated down the stream; but when the ice of which I am speaking forms, the case is perfectly hopeless; the leads are gorged up from the very bottom, and it is in vain to attempt to remove the obstruction. This kind of ice is called in Germany *grund eis*; in France it is known

by the name of *glace de fond*; and in the south of Scotland it is called *lapped ice*, an epithet which the common people apply to the natural congelation of milk. I am happy, however, that the phenomenon has now attracted the attention of some eminent philosophers, particularly of the celebrated Arago in France, who has been at great pains in collecting a variety of facts, and has proposed a theory for the explanation of the appearance, which I shall shew to be utterly inadequate for the purpose; and which, with the modesty that characterizes genuine philosophy, he admits does not thoroughly satisfy himself.

I beg leave to call the attention of the meeting, for a moment, to the phenomenon itself. Every inhabitant of Perth who has witnessed the setting in of a severe frost, must have observed that before the *true ice*, as I may call it, has made much progress in advancing from the sides to the centre of the river, nearly the whole body of the stream above the bridge is occupied by large irregular masses of floating ice of very considerable thickness, far beyond any thing that could be effected by the natural operation of the frost in surface freezings. I believe it has seldom occurred to any observer to inquire how these masses of amorphous ice were formed; they all come down the river from a great distance; and being stopped, at last, by the flow of the tide, and closely compacted together, they are agglutinated by the frost, and present great obstacles to navigation. Now these masses are precisely the ice in question; they are formed in the most rugged currents, adhering to the projecting rocks and rough inequalities at the bottom, and increasing upwards, till their bulk and smaller specific gravity as compared with water, enable the stream to tear them from their fastenings, and hurry them down the river.

I shall mention a few of the facts which M. Arago has collected on this subject, and it is curious enough to observe from this statement that, what is perfectly well known to every peasant, is still called in question by the majority of the natural philosophers of France; they deny the existence of *ground-ice*.

M. Beaun, in 1788, wrote several dissertations chiefly to establish the existence of *ground-ice*, from observations made by himself and by the fishermen on the Elbe. He informs us, that the latter declared that the baskets which they let down into the river, for the purpose of catching eels, were often when brought to the surface, incrustated with ice; that the anchors used for mooring their boats when lost during the summer, again appeared in the following winter, being raised by the ascending force of the ice at the bottom, with which they had been covered to such an extent as to render them buoyant; and that this ground-ice often raised up the large stones to which the

buoys were fastened by chains, and caused the greatest inconvenience by displacing these useful signals.

Desmarest, a member of the French Academy of Sciences, was among the first who made observations on the formation of *ground-ice*: but he advances no theory on the subject. He says he had seen flakes of ice formed at the bottom of running streams, increasing to the thickness of five or six inches in a single night. A more extraordinary fact than this was communicated to myself about two years ago, when my first paper was announced in the newspapers. A miller, in the western part of the country, wrote me a letter containing a theory of his own, ascribing the phenomenon to the prevalence of particular winds; in confirmation of which he mentioned, that during a severe frost, when his mill-lead was entirely free of any kind of ice, he had occasion one day to lop some branches from a tree which overhung the lead; one of them fell into the water and was left there, as he did not apprehend any consequences from such a trifling occurrence. Next day, however, to his astonishment, the water was turned entirely out of the lead, and had overflowed a large portion of an adjoining meadow. On proceeding to ascertain the cause, he found that a solid barrier of ice had been formed across the lead where the branch had fallen in, so as completely to prevent any water from passing, whilst the rest of the lead was free from ice. He ascribes this to the prevalence of a very sharp northeast wind which had blown during the night. There can be no doubt that this is converting into a cause, what is merely an accidental concomitant, as I shall shew hereafter.

On the 16th February, 1827, M. Hugi, president of the Society of Natural History at Soleure, while standing on the bridge of the Aar, and when the river was perfectly clear of ice, observed in these circumstances, large icy tables continually rising from the bottom of the river, in a vertical direction, and with such buoyancy, as to rise considerably above the surface, when they immediately sunk into a horizontal position, and floated down the stream. A great many facts of the same kind may be found in M. Arago's paper, which is given in the *Edinburgh New Philosophical Journal* for July last; which is the first paper on the subject of ground-ice that I have ever seen.

Let us now attend for a little to the cause of these singular phenomena, and I will be bold to say that no adequate cause has yet been assigned for them; unless the hints which I formerly threw out on the subject as queries, rather than as ascertained facts, shall be considered sufficient for the purpose. M. Arago gives his theory as to the cause at great length. It is simply this, that the different strata of water, in a

running and shallow stream, being all mixed together by the agitation caused by the inequalities of the bottom, are all cooled down during an intense frost to the freezing point, and that the stones there form proper points of attachment to facilitate the formation of icy crystals. This is, in fact, the same answer that was given to my theory, in some of the newspapers, two years ago; but it is altogether inadequate, for this plain reason, that, according to it, the phenomena of ground-ice ought to appear in every hard frost, when the water reaches the requisite temperature. But so far is this from being the case, that in the hardest frosts which we have ever seen, not a particle of ground-ice was found in the river. Take, for instance, the very severe frost of 1813-14, when the Tay was frozen over for many weeks, yet no ground-ice was to be seen. Some gentlemen present may remember to have skated down the stream and through below the arches of the bridge, whilst the ice everywhere was as clear as crystal, and the bed of the stream entirely free from the white spongy ground-ice.

Some now present will probably recollect that the theory which I proposed, as a solution of these phenomena, was founded on information which I had received from country people and others, whose operations depended on water-wheels, and whose interests forced them to attend to appearances, which might pass unheeded by others. The sum of their information was, that the ground-ice was never formed but after a heavy *rione*, or hoar-frost. If this is the fact, the explanation is obvious. The hoar-frost, which is congealed moisture, precipitated from the atmosphere, and falling into the river when the water is cooled down to the freezing-point, cannot be dissolved. It retains in the water the very shape in which it descends from the air. When these small crystals fall on a deep unfrozen pool, the water being above the freezing-point, the particles melt and are incorporated with the water; but in the shallow and agitated stream, almost the whole water is brought in succession, into contact with the intense frost, and may thus be cooled down to the freezing-point to the very bottom of the stream, before even a pellicle of ice is formed on the stagnant pool. All the particles of hoar-frost, then, or frozen vapour which fall on such a stream will remain unmelted; and being tossed in all directions by the agitations of the current, will be brought into contact with the rocks, or other substances projecting from the bottom, to which they will readily adhere, and form a nucleus for that strange accumulation called *ground-ice*, which is found nowhere but in streams.

I would not have brought forward this theory a second time, had I not met with some facts collected by M. Arago, which afford the strongest confirmation of the theory which I had advanced, though

he himself scarcely seems to have had a glimpse of their importance. He mentions an observation by Desmarest, that in a cloudy sky the ground-ice accumulates uniformly, but is interrupted when the sun shines. Now, what he calls a cloudy sky I conceive to be an atmosphere loaded with hoar-frost, and rendered hazy by its condensation; for I do not think it possible that a *genuine cloud* can exist in the atmosphere during a keen frost. Here, then, this observer furnishes a fact in perfect accordance with the information on which I proceeded, viz., that the ground-ice is formed only during a hazy state of the atmosphere, in other words, during a hoar-frost; whilst he tells us that the process was interrupted when the sky was clear.

But M. Arago quotes a passage from a paper of Mr. Knight, the celebrated botanist, in the 106th vol. of the Phil. Trans., which brings the matter nearer, if not altogether, to a demonstration, though Mr. Knight himself proposes no theory. The passage is as follows:—"In a morning which succeeded an intensely cold night, the stones in the rocky bed of the river appeared to be covered with frozen matter, which reflected a thread of silvery whiteness, and which, upon examination, I found to consist of numerous frozen *spicula* crossing each other in every direction, as in snow, but not having anywhere, except near the shore, assumed the state of firm compact ice. *The river was not at this time frozen over in any part*, but the temperature of the water was obviously at the freezing-point, for small pieces of ice had everywhere formed upon it in its more stagnant parts near the shore; and upon a mill-pond, just above the shallow streams, in the bottom of which I had noticed *millions of little frozen spicula floating upon the water*. At the end of this mill-pond, the water fell over a low weir, and entered a narrow channel, where its course was obstructed by points of rock and large stones. By these, numerous eddies and gyrations were occasioned, which apparently drew the floating *spicula* under water; and I found the frozen matter to accumulate much more abundantly upon such parts of the stones as stood most opposed to the current (where that was not very rapid), below the little falls, or very rapid parts of the river."

These are by far the most important observations that have been made on the subject of ground-ice. M. Arago is so much struck by them, that, after having concluded his own theory, he says, "It is not certain that the little particles, mentioned by Mr. Knight, do not play an important part in this phenomenon, which I have entirely overlooked." I verily believe they do; only one element is wanting in the catalogue of Mr. Knight's observations to decide my opinion, and that is, the state of the atmosphere during the preceding night. I

am persuaded that it had been loaded with hoar-frost, and its precipitation into the river formed the floating *spicula* which he observed; they could have no other origin; and their being brought into contact with the stones by the gyrations of the stream, is exactly what I had given two years ago as the theory of the formation of ground-ice, by the congelation and precipitation of the moisture of the atmosphere.

It is always delightful to explore the mysteries of nature, and the Author of our being has provided in such researches unbounded exercise for the highest powers of our understanding and reason. Even brute matter gives us some idea of the immensity of its Creator; for notwithstanding the immense strides that have been made in investigating the properties of matter, we may be said to be at this moment only on the threshold of science, and future generations, if the mind goes on to improve, will look back on our most profound researches merely as forming the rude elements of that more perfect knowledge which they will have reached. Perhaps much remains to be known even with regard to the common phenomena to which I have this day directed the attention of this meeting; and, although I think we have nearly reached the solution of our problem in the process of freezing, yet that you may not think the mysteries of congelation exhausted, I conclude with mentioning a fact, which the illustrious Frenchman, whom I have so often quoted, leaves without even attempting an explanation. "During the congelation of the bottom of the Aar, M. Hugi immersed pitchers filled with hot and cold water; the first, on being brought up, was covered with a layer of ice *one inch thick*; the other had no marks of congelation. Bullets covered with cloth, warm as well as cold, afforded similar results."

ON THE ICE FORMED, UNDER PECULIAR CIRCUMSTANCES AT THE BOTTOM OF RUNNING WATER.

By the REV. JAMES FARQUHARSON, of Alford, F.R.S.

From Philosophical Transactions, Vol. 125, p. 329 (1835).

Ice formed at the bottom of rivers and streams, frequently in great quantities, is a phenomenon quite common in this climate. I made for several years past a number of incidental and desultory observations upon it, and became convinced that the principal explanation of its occurrence is the radiation of heat from the solid opaque materials of the bottom; but as I conceived this to be also the generally admitted one, I took no note of the observations, with the view of vindicating the theory of the radiation. It appears, however, from

a paper of M. Arago upon the subject, translated and published in the *Edinburgh New Philosophical Journal*, vol. xv, p. 123, from the *Annuaire* for the year 1833, that he entirely rejects the theory of the radiation of heat through a thick layer of water. In the same paper, although he does not, in conclusion, pretend to give a complete explanation of the phenomenon, he brings forward, as explanations in part, three circumstances, which, although accurately stated by him, appear to be not exclusively appropriate to ice formed at the bottom, and cannot therefore aid us in solving the main question which we have to discuss here, which I apprehend to be, *Why is ice formed sometimes on the surface of running water, and sometimes at the bottom?*

On reading M. Arago's paper, I became desirous of offering some remarks in answer to it, as without some one doing this, on proper data, a misapprehension concerning the cause of a natural phenomenon, so much at variance with our most frequent experience of the formation of ice only on the surface of all waters, as to have often greatly excited the attention and even called forth the astonishment of scientific men, would continue to be propagated under the authority of a distinguished name. Having, however, no record of my former observations to enable me to refer accurately to the time, place, and other circumstances of them, I delayed till a renewed occurrence of ice on the bottoms of our streams should enable me to repeat them.

Such an occurrence, on a great scale, took place in the beginning of this month of January (1835); and I now have the honour of presenting to the notice of the Royal Society a brief account of the observations I have been enabled to make, and of the conclusions to which they appear to direct us.

Previously to entering on this detail and discussion, it seems proper to describe the appearance and quality of the ice formed at the bottoms of streams. A misapprehension regarding these may have been one cause of the incredulity of its existence, entertained by some persons who have never witnessed it, and which M. Arago, in the paper referred to, has deemed it necessary to remove, by bringing forward the testimony of many distinguished men to its reality.

The ice formed at the bottom does not resemble the solid glass-like plates which are formed on the surface. It has nearly the aspect of the aggregated masses of snow as they are seen floating in rivers during a heavy snow shower; but, on taking it out of the water, it is found to be of a much firmer consistence than these, although never approaching to the firmness and solidity of surface ice. It is a cavernous mass of various-sized, but all small, pieces or crystals of ice, adhering together in an apparently irregular manner by their sides,

or angles, or points, promiscuously. Both the firmness of the adhesion and the dimensions of the interstices (the latter filled with water, and their volume easily estimated by the quantity of it which is discharged when the ice is lifted out of the stream), are, however, greatly modified by the intensity and continuance of the previous cold. When the ice begins first to form on the bottoms of the streams, it presents a rudely symmetrical appearance, which, for illustration, may be compared to little hearts of cauliflowers, fixed on the bottom, having a similar uniform circular outline and protuberance in the centre, with coral-like projections. These pieces have a shining silvery aspect; they are dispersed, at first irregularly, in small numbers, but increase both in size and numbers, till the whole bottom is covered, and, if the frost continues severe, grow in height, but in a very irregular manner, so as to obliterate the earlier somewhat symmetrical shapes, till the streams are raised high above their former levels, and frequently made to overflow their banks.

And here I take the opportunity to notice the incorrectness of an observation of Desmarest, quoted by M. Arago, and which, as M. Arago observes, no one has corroborated, "that it was from the lower parts, which touched the bottom, that the flakes of ice successively increased." On the contrary, the forms of the surface of the earlier masses are continually obscured, in succession, by new ice added to the top.

This congealed mass being thus very different in appearance and consistence from the sheets or plates generally known by the name of ice, it were no doubt well that, like the Germans who, M. Arago informs us, name it *grundeis*, we too designated it by another name, to prevent confusion or misapprehension when we refer to it. The inhabitants of this part of the country will furnish us with a better one than even that of the Germans. In a district where it occurs almost every winter, and often repeatedly during the season, and where many of the rivers are crossed by means of fords, its existence influences too much their economical arrangements not to excite their particular attention, especially as many horses refuse to enter any stream even slightly impeded by it, being greatly alarmed by the pieces which break and float up from the bottom by the action of their feet. A body with which all are so well acquainted is known by an appropriate name. They call it *ground-gru*; *gru* being the term by which they designate snow saturated with, or swimming in water. I shall venture to use their term for the ice formed at the bottom.

It will be better here also to state, generally, the conditions of temperature and phases of the weather under which the *ground-gru* is formed. I have seen it occur only when the temperature of the

whole mass of water was reduced to, or nearly to 32° Fahr., and when the temperature of the air was several degrees below that point. I have observed it in invariable condition, that it was preceded by a continuance, for some time, of a clear, or very nearly clear, state of the sky.

This is at variance with another observation of Desmarest, quoted by M. Arago, that "when, in consequence of a cloudy sky, the atmospheric temperature experiences little variation throughout the day and night, the ice at the bottom of the water uniformly increases every twenty-four hours; on the contrary, when the sun shows itself, the ice does not increase during the day." It is the fact, that while it is forming under the continuance of a cloudless sky, its increase is impeded during the day. It may be possible, amidst the infinite variety of measures of cold that may exist at the time, that the increase of the gru may go on for a little time after the sun has been obscured by a thin cloud; but I have always seen, that when a densely clouded state of the sky supervened, and continued for the space of even only twenty-four hours, the gru became detached from the bottom, and floated down the stream. Should the temperature of the air continue low, with the clouded sky, or get lower, the ground-gru is not renewed, but the river is speedily frozen over at the surface. It is, in fact, a matter of frequent occurrence, in frosty winters, that our rivers, filled, and so impeded, by ground-gru, as to be raised above their banks, are found returned into their natural channels, and there frozen over at the surface, but flowing over a clear bottom, in a space of time so short as to appear very wonderful to those who have not investigated the cause. The process is named, by the country people, the *flitting* of the ice. In opposition to the observation of Desmarest, and in confirmation of those which I have made, on this point, I may refer to the Rev. Mr. Eisdale, who, not satisfied with the explanations of M. Arago, has published one of his own, in the *Edinburgh New Philosophical Journal*, vol. xvii, p. 167. His explanation appears equally unsatisfactory, as will be shown afterwards; but the part of his statement we have to do with here is his notice of this observation of Desmarest. The formation of the ground-gru, under a cloudy sky, is so much at variance with the information which Mr. Eisdale had received, that he resolves Desmarest's "cloudy sky" into "an atmosphere loaded with hoar frost, and rendered hazy by its condensation." The state of the air, in respect of being windy or calm, deserves also to be noticed. The ground-gru occurs most frequently during calm, with a deposition of hoar frost upon the ground at the time; and

this was the condition of matters during the observations now to be detailed. But it also occurs during a frosty wind, when there is no hoar frost, which is formed only in a calm state of the atmosphere. The formation of the gru during wind, and consequently without any deposition of hoar frost on the ground, is especially to be noticed in reference to Mr. Eisdale's explanation, as will be afterwards seen. It occurred to M. Hugi, as quoted by M. Arago, in the Aar, on the 16th February, 1827, with a west wind, after the river had been completely open on the 15th; and one of Mr. Eisdale's correspondents ascribed its occurrence in one particular instance, which he related to him, to the prevalence of a very sharp northeast wind, which had blown during the night of its formation.

The following observations were made in the rivers Don and Leochal. The former having an easterly course, is about 120 feet broad, and a foot or two deep at the shallows and fords. The latter, one of the small tributaries of the former, having a northerly course, is about 20 feet broad, and a foot deep at the shallows. Both rivers possess a like character of very clear water, and alternating rapids and pools. The rapids in the Don are reaches, where the water falls two or three, or more, feet, from a higher to a lower level, within a distance of fifty or a hundred, or sometimes two or three hundred yards. They are generally impeded with many large stones, some of them projecting above the water. The depth varies greatly, but seldom exceeds two or three feet. The pools between the rapids are on an average much longer reaches, in which there is little fall, and a greatly diminished velocity of the stream, which often, in them, flows so equally as to give rise to no ripple on the surface. They too have in them large stones, but fewer in number. The depth in them too varies greatly, from two or three to four or five feet. The rapids and pools in the Leochal are of a similar kind, but both much less deep in this smaller stream. The bed of this river has, however, on the whole, a steeper descent, and owing to this there is more broken water and spray in the rapids. The character of alternating rapids and pools, in both streams, is owing to the varying hardness of the granitic and micaceous-schistose rocks in which their beds are formed. Where the rocks are hard, there is a rapid; where more friable, a pool. In the parts of the rivers observed, the original rocks themselves do not anywhere form the immediate bed of the stream. That, to the depth of two or three, or more, feet, is composed of the debris of these rocks, broken up and sometimes much waterworn, and reduced to the size of a very large gravel, by the action of the stream, but not so small as to deserve to be named sand. No part of the bottom is muddy.

On the night between the 31st of December, 1834, and the 1st of January, 1835, after the mean temperature of the air had continued for three days at 47° Fahr., and when there had been little frost in the season before, there commenced a hard frost, with a calm and perfectly cloudless sky, which continued with little abatement till the 5th of January, at 10 a.m. In the night between the 3rd and 4th, the temperature of the air was 23° Fahr.; and on the 4th, the bottoms of the rapids in the Leochal were seen coated in some places with silvery cauliflower shaped clusters of ground-gru. I neglected at this time to examine the temperature of the water.

Between the 4th and 5th the temperature was down to 19° Fahr.; and on the 5th I examined the Don and the Leochal along half a mile of each, beginning the examination at half-past eight o'clock a.m. The examination began at the bridge of Alford, built of granite over the Don, in the middle of one of the rapids. At this rapid, the whole bottom, with the exceptions to be immediately stated, was covered with silvery gru, appearing from two or three to five or six inches deep. My attention was particularly directed to the exceptions, as throwing a clear light on the question of the radiation of heat from the bottom. Round each of the piers, and in front of the abutments of the bridge, there was a space quite clear of all frozen matter, excepting at a side of one pier under an arch, where a piece of very still water, caused by an obstruction at the bottom, was covered by clear sheet ice. On the south side of the river, two embanking walls, one up and the other down the stream, each twelve yards long, are built in a line with the water courses of the abutment. Close to the bridge these walls are eight feet high from the bottom of the stream, but as they recede from the bridge the masonry slopes gradually to a lower level, till the extremities are little above the level of the water. The bottoms in front of these walls are clear of ground-gru, as well as that in front of the abutments; but the breadth of the clear space in front of the walls narrowed gradually towards their extremities, in proportion as the masonry became lower, till at the extremity of the downward wall especially, which ends at a sloping gravelly bank, the gru came to the edge of the water. The space of the bottom clear of gru was about five or six feet broad at the high parts of the walls next the bridge; and the water runs on the place at the medium depth and velocity of the rapid. There was another clear space in the bottom of this rapid. About twenty-five yards above the bridge there is, in the middle of the stream, a piece of still water, caused by an elevated bed of gravel, just below it, over which the stream is very shallow. The still water, for an extent of two or three square poles, was covered with

sheet ice, and that again covered by a very thin, but white, opaque deposition of hoar frost. From under this ice the water, flowing rapidly over the gravel bed below, had no ground-gru for a space of eight or ten yards downwards.

Above this rapid, a pool of moderate stillness, about three or four feet deep, extends a hundred and fifty yards in length. Over the bottom of this there were scattered, in an irregular manner, many cauliflower-shaped clusters of silvery gru, most of them very small, and none that were observed covering more of the bottom than a square foot or two at one place. In the deepest and stillest part of the pool there were several tufts of water starwort, with sooty-coloured decaying leaves, forming the darkest-coloured objects seen at the bottom. These were all densely tangled with fringes of silvery gru. At the head of the pool, where the velocity acquired by the water in the rapid immediately above it was not yet greatly diminished, an appearance of a different kind presented itself. There are here several large stones in the bed of the stream, but none of them projecting above the water. On the faces of those opposed to the stream there were seen quantities of gru of a different aspect from that further down. It was not arranged in the same cauliflower shapes, but in angular masses, like wreaths of snow blown by the wind. It wanted, too, the silvery glance of the other, and had more the appearance of a pale ash-coloured mud. On reaching it with the end of a pole, its consistency was found to be less firm; in fact, it was only a heap of detached uncemented spiculæ pressed against the stones, and retained there mechanically by the action of the water, in a certain modified state of its velocity. The source of these heaps of uncemented spiculæ will soon be noticed. This pool, as indeed was the case with all the pools in the river, had at its edges and in its little bays narrow pieces of surface-ice, extending a foot or two from the banks.

The rapid immediately above this, not unlike that at the bridge, was covered at the bottom with silvery gru, with one exception. The river was low at the time from long-continued deficiency of rain, and the water had deserted the south side of the channel, leaving many little pools among the stones, communicating more or less freely by irregular little currents with the main stream. The pools were covered over with sheet-ice, and that with a thin opaque deposit of hoar frost-like snow. In the little currents returning from under this ice there was no frozen matter.

At the head of this rapid there is a pool much deeper and stiller than that above the bridge-rapid already described. The depth is five feet, and the stillness such that, at many points of it, there is no

ripple or wave on the surface. None of the silvery cauliflower-like ice was seen on the bottom here; but near the head of it, in a modified state of the current pouring in from the rapid above it, there were, on the faces of several large stones opposed to the stream, collections of uncemented icy spiculæ.

The source of these collections was very readily observed in a great rapid immediately above this. In that rapid the water has a much quicker descent than in the others referred to. It is about a hundred yards long, and cumbered with many large stones, over which, at many points, through its whole length, the water breaks with a great deal of spray. Here an immense quantity of gru occupied the bottom, impeding much the course of the stream. At the time of observation many pieces of this gru were seen edging up, and in some instances breaking quite away from the bottom, apparently by the increasing pressure of the water, as it became dammed back by the increase of the gru itself. This at least was the appearance, although there may have been another cause for the disengagement of it from the bottom. and that is, the impeding, by the imperfectly translucent gru, of that radiation of heat from the bottom which, I trust in conclusion to demonstrate, is the immediate chief agent in the whole phenomenon.

It is now to be observed, that a number of pieces of loose gru, the origin of which was so clearly ascertained at this last rapid, were floating down in all parts of the river. In passing through the rapids, they were broken into fragments, and, where the fall was violent, shattered into minute pieces. The larger pieces that remained after passing through the rapids floated at the surface, immediately as they got into the uniformly flowing currents at the heads of the pools; but the minuter ones, mixed with the water to all depths by the plunging whirls in the rapids, not being so speedily disentangled from their cohesion with the water, by the action of gravity, floated for a greater distance immersed in the water, and were intercepted by, and mechanically retained against, the faces of the stones by the action of the stream at the heads of the pools. Further down, and in stiller water, where no such intercepted heaps were seen, their buoyancy had, no doubt, by degrees, overcome the cohesion and raised them to the surface; and in fact, in the still water, many minute icy fragments were floating in the surface.

Mr. Knight, the celebrated botanist, quoted by M. Arago, has obviously, in part, but not completely, distinguished between the "frozen matter which reflected a silvery kind of whiteness," which covered the stones in the rocky bed of the river, and "floating spiculæ under water," which he found to "accumulate much more abundantly

upon such parts of the stones as stood opposed to the current, where that was not very rapid, below the little falls or very rapid parts of the river."

In the smaller stream of the Leochal, the quantity of ground-gru was comparatively much more abundant, occupying the bottoms both of the pools and rapids in close masses, and in the latter, at many parts, forming such an impediment as to urge the water over its usual banks. But there were two remarkable exceptions. One of the pools flows close to the foot of a steep bank about fifteen feet high, and in the side next the bank there was little ground-gru. In a rapid, which at a turn of the river has an easterly course, there was a very dense fringe of *Phalaris arundinacea* standing, with its dense foliage of withered leaves, in the south edge of the water. Its height was four feet, and it extended fourteen feet in length along the stream. At the foot of it the bottom of the rapid was clear of ground-gru to the breadth of three feet.

The temperature of the air and water, at the time of these observations, was particularly ascertained. That of the air at sunrise, about an hour before the observations commenced, had been 23° Fahr.; but it was rising rapidly during their progress, and was at 36° Fahr. before their conclusion. The temperature of the water in the Don varied from 32° to 33° Fahr.; but the variation could not be distinctly traced as depending on the depth or velocity, as there was a temporary variation in the same place, both in the pools and rapids. At one of the small streams, returning from under the sheet-ice on the little pools at the edge of one of the rapids, the temperature was nearly steady at 33° Fahr. In the Leochal the temperature was nearly steady everywhere at 32° Fahr.

By 10 o'clock a.m. on the same day, a cloud obscured the whole sky, and at 2 o'clock p.m. the temperature of the air was 40° Fahr. At this time much gru rose from the bottom and floated down the streams of both rivers. The relaxation of the frost, however, was of very brief continuance. Before sunset the temperature of the air was again down to 31° Fahr., with a perfectly calm air and clear sky; and the clear sky continued till the evening of the 7th of January, the thermometer during the two intermediate nights being at 23°, and during the intermediate day at 26°.

The same parts of the Don and Leochal were again examined at 10 o'clock a.m. on the 7th. In the Don the ground-gru now covered all the bottoms of the pools as well as of the rapids. It was of less depth in the deep still pool below the great rapid; but everywhere else it formed a great impediment to the stream, raising it so much

above its former level that it covered deeply the pieces of sheet-ice formed at the edge of the 5th. New pieces of similar ice were now forming at the same places on the more elevated surface. The Leochal was still more impeded by the gru than the Don.

But, what is worthy of particular notice, the clear spaces of the bottom, at the piers, abutments, and embanking-walls of the bridge on the Don, and at the Phalaris grass in the Leochal, still continued so, but were now considerably narrowed in their lateral dimensions, the ground-gru having encroached upon them on the sides next the steams. The temperature of the air was 24° Fahr.; of the water, everywhere nearly steady at 32° .

Several circumstances occurred on some subsequent days which deserve to be noticed, as throwing light, by the contrast which they exhibit, on the phenomenon now under consideration. On the 8th of January there occurred a thaw, when the thermometer suddenly rose to 47° Fahr. The rivers were speedily cleared of ice and ground-gru, which last rose from the bottom and floated away with the steam. The atmosphere at the time was considerably clouded, with a brisk S.W. wind. On the 9th of January the temperature of the air fell to 36° Fahr.; and on the morning of 10th of January, with a temperature of the air at 29° Fahr., there was a fall of snow, of about an inch deep, which ceased by 8 o'clock a.m. The snow that fell into the rivers was observed to be entangled, and stuck fast, in irregular crushed masses, in many parts of the rapids; and there were collections formed of loose spiculæ of a muddy aspect, at the sides of the stones opposed to the streams in the heads of the pools, where the velocity of the currents was intermediate between that of the rapids and that of the stiller parts of the pools; but there was no appearance on any part of the bottom resembling the symmetrical cauliflower-shaped ground-gru. On the evening of the 10th the temperature of the air fell to 23° , and continued at from 23° to 21° till the morning of the 12th, with a densely clouded state of the sky. During this time extensive sheets of surface-ice were formed on the pools of the Don, and many of the pools of the Leochal were quite frozen over, but the ground-gru was nowhere renewed; on the contrary, the masses of snow entangled in the rapids on the 10th disappeared to a great extent, obviously floating away in the stream. In this state of the river and weather, the collections of uncemented spiculæ, on the faces of the stones opposed to the streams in the heads of the pools, appeared in their places the same as before, neither increasing nor diminishing in size.

M. Arago, in his paper, refers to three circumstances, as partly, at least, explanatory of the formation of ground-ice in running water.

1st. The inversion, by the motion of the current, of the hydrostatic order, by which the water at the surface, cooled by the cold air, and which at all points of the temperature of water under 39° Fahr. would, in still water, continue to float on the surface, is mixed with the warmer water below, and thus the whole body of water to the bottom is cooled alike by a mechanical action of the stream;

2nd. The aptitude to the formation of crystals of ice on the stones and asperities of the bottom, in the water wholly cooled to 32° , similar to the readiness with which crystals form on pointed and rough bodies in a saturated saline solution:

3rd. The existence of a less impediment to the formation of crystals in the slower motion of the water at the bottom, than in the more rapid one near, or at the surface.

There is no denying the justness of these three positions, and yet the slightest reflection teaches us that neither singly nor combined do they aid us in answering the main question before us, "Why is ice formed sometimes at the surface of running water, and sometimes at the bottom?" All the circumstances, or conditions, referred to by M. Arago, are present when ice, as most frequently takes place, is in the course of being formed only on the surface, as well as when the formation is going on at the bottom. Were we to admit them as an answer to our question, then running water ought always to freeze first at the bottom. But a most extensive experience teaches us that this is not the case. The illustrations of M. Arago, indeed, just and true in themselves, are not to be overlooked when we would investigate and explain the formation of ice either at the bottom or at the surface. They will serve to enlighten us greatly in both these events, but they have no exclusive relevancy to either, and we must therefore look out for another solution of the problem.

M. Arago, in his conclusion, does not present these three circumstances as a complete explanation; but he says, the reader may ask why he has not done so, and he answers to this, "that we have no observations which prove that this kind of ice is seen, until the temperature of the whole of the water is at zero" (centigr.); and that it is not certain that the little icy particles, seen by Mr. Knight, floating on a milldam, at the time ground-ice was forming in the stream, and which may have acquired in contact with the air a temperature below zero (centigr.), do not play an important part in the phenomenon which he has overlooked.

In regard to the former of these points, I cannot say what M. Arago would have deduced from it, had it been established in one way or the other. The observations made on the Don on the 5th of January show that the temperature of the whole water was not quite down to 32° Fahr. when the ground-gru was forming in large quantity. In regard to the latter, the little icy particles seen by Mr. Knight, the same condition belongs to them that belongs to the circumstances professedly adduced by M. Arago, as explanations; that is, they occur as well when the ice is forming on the surface only as when it is forming on the bottom. They account well, however, for the collections of frozen matter seen by him at the sides of the stones opposed to the stream, in parts where its velocity had a certain modification.

And here I may advert to the explanation offered by the Rev. Mr. Eisdale, in his paper already referred to. From the information he received, he was led to believe the ground-gru does not occur but when there is a hoar frost on the ground; and he explains the ground-gru to be particles, or crystals as he afterwards names them, of hoar frost precipitated into the water, retaining there the shapes in which they descended, brought into contact with the rocks by the agitation of the water, and forming nuclei for the accumulation of ground-gru. Could it be proved that such crystals are precipitated into the water, they would serve no more for explanation than the icy particles of Mr. Knight. We have learnt, indeed, from travellers in high northern regions, that, in certain states of cold and moisture of the air, such crystals, as Mr. Eisdale assumes, are there seen and felt floating in it; but nothing of that kind was observed in January last; and when Mr. Eisdale, from the existence of spiculæ of hoar frost on the ground, would infer the like may be formed in the air to fall into the water, he neglects to take into the account, that the spiculæ of hoar frost have not fallen from above, but that their symmetrical arrangement, round on all sides of the bodies on which they are found, and their slow increase, prove they have been deposited on their places by a gradual deposition of invisible watery vapour, owing to the substances to which they are attached being cooled below the temperature of the surrounding air, by the radiation made known to us by the experiments of Dr. Wells. Besides this we have to remark, that the ground-gru sometimes takes place, agreeably to the information of one of Mr. Eisdale's own correspondents, in a windy state of the atmosphere, at which time no hoar frost is seen.

The interesting experiments of Dr. Wells just referred to enable us to give, after all, a very satisfactory explanation of the ground-gru; and Mr. McKeever, quoted by M. Arago, had gone far to illus-

trate it by means of them, although he had overlooked some conditions necessary to be taken into account for a complete explanation. M. Arago, however, entirely rejects the explanation of Mr. McKeever, and it is fair to set down the terms in which he does so.

After having shown that the ground-gru cannot be explained by the action of the moon,¹ according to the sailors, nor by the friction of running water producing more heat at the surface than at the bottom, nor by referring its source to the smaller tributaries of the streams, nor to different layers of ice formed at the several surfaces, when the water in the river, from whatever cause, is in a state of varying fullness, all of which have been assigned as causes of the ground-gru, M. Arago proceeds:

"We come now to Mr. McKeever, who, confining himself closely to the most subtle principles of the theory of heat, has not on this account been more fortunate than his predecessors. According to this author, 'the rocks, stones and gravel, which generally cover the bottoms of rivers, have powers of radiation superior to those of mud, perhaps on account of their peculiar nature, but chiefly because they have rough surfaces. Thus rocks in large or small masses will become much cooler in consequence of radiation; when the atmospherical temperature is very low, they of course freeze the water which touches them. It is unnecessary to examine here whether heat radiates through a thick layer of water, as Mr. McKeever supposes, as the most simple observation is sufficient to overthrow it. Where is the person who has not observed that the strong radiation, which the Irish philosopher admits, would be more plainly manifested, or as completely, in still water than in running water? But no one has seen a piece of still water frozen at the bottom.'" ²

But there is nothing more easy of experimental proof than that heat radiates through water. I do not mean, however, to vindicate the reasoning of Mr. McKeever respecting the more powerful radiation of it from stones and from mud. His reasoning respecting the matter is, on his own part, conjectural, to explain the readier formation of gru on a stony or gravelly bottom; but the gru also forms on a muddy bottom, a fact which M. Arago notices, when he brings the attachment of mud to the under side of the floating flakes as a proof that they have been formed at the bottom. Mr. McKeever was driven to his

¹ This explanation of the sailors is a confirmation of what I have stated, that the gru never appears but under a clear sky. The constant observation of the sailors has associated, in their minds, the shining of the moon with the ground-gru; but the moon never shines, to excite great attention, but in a clear sky.

² Edinburgh New Philosophical Journal, vol. xv, pp. 132, 133.

conjecture from having overlooked the more complete and sudden inversion of the hydrostatic order that takes place over stones than over mud; which last is deposited only in places where the water has a stiller and more equable motion. In such places the ground-gru is later in forming, and therefore is more rarely seen; and it is doubtful whether Mr. McKeever had a proper opportunity for noticing it in them.

But to return to the main point which we have here to maintain in opposition to the reasoning of M. Arago, the radiation of heat through a body of water. When we construct an achromatic object-glass for a telescope, it does not the less remain a burning-lens when we have included in it a transparent fluid, and no experiment has proved that were the fluid water the case would be altered. We are aware of the danger that has been incurred setting fire to an apartment by an ornamental glass globe filled with water, and placed in the sun at a window. But as I cannot particularly refer to circumstances of time and place of the cases now mentioned, I made an experiment on the subject with such apparatus as I could find readily at hand, having no access to better in a remote country place.¹ In a room, of which the temperature was 50° Fahr., a semiglobular tumbler filled with water, containing about a pint and a half, was placed inside a window, in the rays of the low but clear winter sun. The bulb of a thermometer, which had been previously placed in a similar situation till it rose and remained steady at 61°, was shifted into the brightest part of the fan-shaped focus of rays, into which the light was refracted through the tumbler. In this position it was raised in four minutes to 72°. It was again shifted into the unconcentrated rays passing through the window, when it fell, but more slowly than it had risen; and the experiment was repeatedly renewed with similar results, leaving no doubt that the heat, like the light, radiated through, and was refracted by the water. If the fact is so in regard to the radiation of heat through a mass of water four or five inches thick, where ought we to set the limits of thickness of the mass through which it cannot pass? Obviously, only where the thickness is so great, that the aggregation of the fluid, and of its minute impurities, prevents the transmission of light, as in the deeps of the sea, but not within the ordinary depths of our clear streams.

Of the effect of radiation in cooling down the surface of the ground, and substances placed upon it, during a clear sky, we cannot

¹ It may seem absurd to have had recourse to experiment in a case so plain; but the procedure seemed, at the same time, indispensable, to meet reasonings promulgated with the authority of such a distinguished name.

give a more lucid account than that of M. Arago, in his paper "On the supposed Influence of the Moon on Vegetation." "No one had supposed," says he, "before Dr. Wells, that terrestrial substances, excepting in the case of a very rapid evaporation, may acquire during the night a different temperature from that of the surrounding air. This important fact is now well ascertained. On placing little masses of cotton down, etc., in the open air, it is frequently observed that they acquire a temperature 6° , 7° , or even 8° centigr. below that of the surrounding atmosphere These differences of temperature between solid bodies and the atmosphere only rise to 6° , 7° , or 8° of the centesimal scale, when the sky is perfectly clear. If the sky is clouded they become insensible." This lucid statement, however, requires one modification; for the greater cooling of the solid substances, under a clear sky, takes place not only during the night, but also during the day, in places not directly exposed to the sun's rays.

This radiation, as it passes freely through the transparent atmosphere, may, as we learn from the above experiment, pass also through the transparent water, to cool down the solid substances at the bottom below the temperature of the surrounding fluid. That fluid is permeable to radiating heat as well as the atmosphere. The application of the thermometer, in the hands of Dr. Wells, instructed us regarding the cooling of the surface of the ground; but the water of a river, placed under the very same condition of a clear sky, fluid above and freezing below, is a great natural thermometer, teaching us that a corresponding cooling is going on on the surface of the solid opaque substances of the bottom. In fact, if we may so speak, the phenomenon of the ground-gru is the result of an experiment in the water, entirely similar to that of Dr. Wells on the land, performed by nature on a large scale, and presented to us for our interpretation and instruction. And when we look back to the observations made in the month of January, we find the results of the modifications of this great natural experiment corresponding with those of similar modifications of the experiment on the dry land.

The cooling of the surface of the ground by radiation, discovered by Dr. Wells, takes place only under a clear sky. It is therefore greatly modified on parts of the ground screened from a part of the sky by opaque objects, as walls, trees, hedges. In illustration of the extent to which a screening or shading body, near at hand, modifies the radiation, I shall detail some observations I made on the 7th of January last, incidentally in the first instance, but then extended, in reference to the observations on the ground-gru, which I was making at the time. Having occasion that day to dig into recently hoed

ground, in the middle of a garden, remote from shade, the soil was observed to be frozen to the depth of four inches, by the clear frost, which had continued from the 1st of January, with the trifling intermission above mentioned. On digging into similar ground at the north base of a wall six feet high, the soil was found, close at the foot of the wall, frozen to the depth of only half an inch; at a foot distance from it, about an inch; at two feet, little more; and it was only at the distance of ten or twelve feet that it was frozen hard to the depth of three inches. A similar modification of the effect of radiation was observed in the shade of trees. Under the Scotch fir the soil, slightly covered with decaying herbage, was not at all frozen; although in similar ground, similarly covered, but remote from shade, it was hard frozen to the depth of two or three inches.

Now the ground-gru in the rivers was modified in a way strictly similar by the effect of shade. The bridge of Alford, over the Don, is happily situated for illustrating this, being on one of the rapids, where the ground-gru is earliest and most abundantly formed. While the other rapids, and the unshaded parts of this one, were quite occupied by gru on both the 5th and 7th of January, spaces in the shade of the masonry at this bridge were quite clear of it. It cannot be admitted as an explanation of this fact, that heat may have been there laterally transmitted to the water by contact with the piers and walls; for if this took place, why then did the clear spaces on the bottom narrow gradually towards the low extremities of the embanking walls? Besides, the transmission of heat laterally had not hindered the formation of surface-ice, in contact with a pier, on a piece of still water under one of the arches. The modification of the radiation by shade was also exhibited in the absence of all gru on the bottom, along the foot of the dense tuft of *Phalaris* grass in the Leochal, where there could be no more transmission of heat laterally, than at the general line of the grassy banks of this stream.

The water, too, returning warmer from under the surface-ice, on the little pools at the edge of one of the rapids, is another instance of the modification of the radiation by shade. The thin white opake covering of hoar frost on the ice prevented radiation, at least in a great measure, and the heat of the bed of the river, in the course of continual transmission upwards, from strata not yet cooled to much depth by the frost, finding no outlet by the radiation, was expended in heating the water by contact.

There was another phenomenon observed on the 5th of January, (although no longer seen on the 7th, being then concealed by the immense formation of gru), which can be readily explained by the

admission of the radiation of heat through the water, and therefore goes to support the justness of the theory. The tufts of water starwort, in the deepest and stillest parts of one of the pools, were the darkest-coloured objects seen at the bottom, and they were fringed in every part with spiculæ of gru, at a time while it yet occupied little of the bottom of this pool. The experiments of Boyle, Franklin, Rumford, Leslie (although he denies the conclusion himself), Davy, and Stark appear too uniform in their results to leave any doubt remaining, that dark-coloured bodies both absorb and radiate heat more freely than those which are light-coloured. It is in consistency, then, with an ascertained law of the radiation of heat, that the very dark-coloured tufts of the water starwort should have been the first bodies in the pool cooled to a very low temperature, and, of course, first covered with gru.

In arguing the whole question, let us not forget to assign a proper value to the illustrations of M. Arago. The first of them suggests a ready and satisfactory answer to one of the objections which he brings against the theory of radiation, which is, that the effect of it should be as readily manifested in still as in running water, and yet no one has seen a piece of still water frozen at the bottom.¹

In still water, that hydrostatic order, which M. Arago has so well illustrated as belonging to water when reduced to a temperature under 39° Fahr., has free play to establish itself, and is not inverted by the mechanical action of the stream. When the temperature of a body of water is under 39°, then the coldest portions of it are the lightest and naturally rise and float on the surface. When in a still pond the water nearest the bottom has been cooled below the general temperature by contact with the solid materials cooled by radiation, it is displaced by the heavier warmer water above. Hence ice forms first on the surface by the meeting there of both the cold of radiation and that acquired by contact with the incumbent cold atmosphere.

¹ There is an exception to the universality of this position, which, although rare, I have sometimes witnessed; and as the phenomenon is in accordance with the theory of the radiation of the heat from the bottom, it deserves notice. In little ponds of a foot or two deep, dug to obtain the materials for building or agricultural purposes, of which there are many examples in this neighbourhood, after they have been covered, owing to hard and long-continued frost, by a thick sheet of ice, that is sometimes nearly melted off, and the remaining fragments driven to the lee side by a strong westerly gale of high temperature. Such a gale in this climate, frequently, towards its conclusion, shifts to N.W., when the temperature of the air falls again below the freezing-point of water, with a generally clear sky. In such peculiar circumstances the little ponds are suddenly filled with gru, commencing at, and shooting up from the bottom. The whole water is here at 32° Fahr. when the gru begins forming, and the hydrostatic order is deranged by the wind.

M. Arago's illustrations also furnish us with a satisfactory explanation of the curious facts, that the ground-gru makes its first appearance in the more rapid and agitated parts of the stream, and begins to show itself on the bottoms of the stiller parts, and to accumulate there in quantity, only after a longer continuance of the clear, frosty weather. In the rapids the hydrostatic order is overturned, and the colder, which is also the lighter, water not only mixed with the warmer below, but, at the whirls of the greatest rapids, brought suddenly, without much mixing, into direct contact with the bottom, cooled still lower than itself by radiation. If the water is at the temperature of 32° Fahr. it can give out no heat to the colder bottom without part of it being converted into ice, the spiculæ and crystals of which find a solid body for their attachment at the very point where the heat is given out.¹

But while in this manner we can explain some of the incidents, may it not be held, as above demonstrated, that the chief cause of the ground-gru is the radiation of heat from the bottoms of the rivers? Every branch of the phenomenon is of easy explanation when we admit the radiation; and among the rest a circumstance to which I have yet made no reference, and that is, the disappearance at the bottom of the water of the immense quantity of heat, 140° of Fahr., which constitutes the caloric of fluidity disengaged, when water at 32° Fahr. is converted into ice at the same temperature.

The answer to our original question then is, That ice is formed sometimes on the surface of running water, and sometimes at the bottom, because frost sometimes takes place with a clouded sky, which is incompatible with radiation of heat from the bottom of the stream, and sometimes with a clear sky, when that radiation takes place through the water, in the same manner as the experiments of Dr. Wells prove it goes on, under a like sky, through the atmosphere. The bottom is by this cooled down below the freezing point of water, before the water itself: ice is formed on it, and its detachment by transmitted heat from below prevented as long as the radiation continues.

¹ We may observe also, that there is a local source of greater cold of the water in the rapids, in its being brought into more active and extensive contact with the air by a sharp ripple and spray.

ON GROUND-GRU, OR ICE FORMED, UNDER PECULIAR CIRCUMSTANCES,
AT THE BOTTOM OF RUNNING WATER.

By JAMES FARQUHARSON, LL.D., F.R.S.,
Minister of the Parish of Alford.

From Philosophical Transactions, Vol. 131, p. 37 (1841.)

In a paper of mine on Ground-gru, or ice formed at the bottom of running water, which was honoured with a place in the Philosophical Transactions,¹ I had inferred, from a great many conditions attending remarkable occurrence of the phenomenon in the rivers Don and Leochal, in the beginning of January, 1835, as well as from its occurring only when the air is at the time quite clear, that it is caused, when the water has gone down in temperature to the freezing point, by the bottom of the water being cooled to a still lower temperature, in the same manner as the surface of the dry land, under a clear sky, is cooled down below the temperature of the air, as first demonstrated by the experiments of Dr. Wells.

As the accuracy of the conclusion at which I arrived respecting the question has been controverted, I respectfully request the Royal Society to permit me to present to them brief notices of some recent occurrences of ground-gru, in the same rivers to which I formerly referred, the conditions of which seem to me strongly to confirm the accuracy of the views I presented regarding the cause of the phenomenon; and also to answer some of the objections which have been brought against it.

Cold weather commenced on the 20th December, 1840 (on which night the thermometer went down to 31°), and continued with frost every night, yet never below 26° , and with frost also through most of the day, till the 31st of the same month. By the 26th December, surface ice in considerable quantity was formed on the edges of the small river Leochal, and the temperature of the water was down to the freezing point. Down to the evening of the 28th the weather was cloudy, and there was no appearance in the river of anything resembling ground-gru; but on that night the sky suddenly became clear, and before the morning of the 29th, the bottoms of all the rapids of the little river were thickly coated by the ground-gru. The gru disappeared as speedily as it had formed, when, on the 29th, a close cloud, depositing slight showers of snow, again covered the whole sky, and continued till the temperature of the day and night rose above freezing.

¹ Part II, for 1835, p. 329.

In comparison with this, I would refer to a series of frosty days from the 1st to the 11th of February, 1841, with a temperature the same as from the 22nd to 31st December, 1840, never descending below 26° . The water of the river descended to the freezing temperature, and surface ice was formed in large quantity on the edges of both the Leochal and the Don. A dense cloud covered the sky during the eleven days and nights, and no ground-gru appeared in the rivers.

A remarkable occurrence of ground-gru took place in both the rivers from the evening of the 7th to the morning of the 9th January, 1841, with a completely clear sky during the time. The thermometer was at 2° below zero on the night of the 7th, at 9° at midday on the 8th, and at 7° below zero on the night of the 8th. I examined particularly the state of the Don, during this extreme and clear frost, before it abated on the morning of the 9th. The bottom of the river was everywhere coated by an immense quantity of ground-gru, excepting where it was partially shaded by bridges, or lofty banks close to the stream. In the partially shaded places the bottom was clear of gru. Thus, this remarkable formation of ground-gru took place under exactly such circumstances as those in which hoar frost or dew takes place on the dry land, when the surface of the earth becomes colder than the air (which we explain by a radiation of heat from the surface of the earth into the clear sky, or by impulses of cold from the sky to the earth), with only this difference, that there was an additional transparent fluid over the bottom of the river, namely, the water; and thus also a shade prevented the formation of ground-gru in the river, as it does that of hoar frost or dew on the land.

In noticing the objections to the explanation I have given of the cause of ground-gru, I shall confine myself to those brought forward by a writer in the Penny Cyclopædia, under the name of Ground Gru, which I have seen only very lately, although I believe they have been published for some years. He says, the explanations of the formation of ground-gru, given by Dr. Farquharson and Mr. Eisdale, are least of all satisfactory, and adds, "The former gentleman says it is the result of radiation, and endeavours to substantiate his reasoning upon the principles of the formation of dew, seeming to forget entirely, that Dr. Wells maintains expressly, that wind and shade are alike obstacles to radiation; and that consequently a body of moving water so deep as to be impervious to light, and particularly when covered, as in the case of the Neva, with a sheet of ice three feet thick, and as much more snow, must present an insurmountable obstacle to the radiation of heat from the bottom of the river."

Now, in the first place, with respect to shade: I was so far from forgetting that it is an obstacle to radiation, that, on the contrary, in my observations in 1835, I had shown by very many instances, that shade had prevented the formation of ground-gru, just as it prevented dew. Wherever shade intervened to prevent radiation from the bottoms of the rivers Don and Leochal, there no ground ice was formed; while the unshaded parts of the bottoms were coated with it. My explanation thus mainly rested upon the fact that shade prevents radiation. In the next place, with respect to wind; the writer in the *Cyclopædia* himself forgets the difference of the statical conditions of air and water in connexion with temperature. Air becomes heavier by diminution of temperature. Water under 39° Fahr. becomes lighter by diminution of temperature. During wind, on the land, the cold air at the surface of the earth is continually mixed with, or displaced by, the warmer air above; and by this process both the earth and air in contact with it are prevented from being reduced to a very low temperature by radiation. But in a body of moving water, whose temperature is under 39°, the eddies of the current throw down the coldest parts, which in still water would remain at the surface, to come into contact with the bottom. This last circumstance is the explanation of M. Arago, and it well accounts for the formation of ground-gru taking place first in the most rapid parts of the streams; although neither by itself, nor when taken in conjunction with the other two circumstances to which he refers, namely, aptitude to formation of crystals on asperities at the bottom, and less impediment to the formation of crystals in a slower motion, will it account for the formation of ground gru, as all these circumstances are present when the water forms only surface ice. The formation of ground-gru requires for its explanation an additional element, namely, the radiation, into the clear sky, of heat from the bottom of the river; and the formation never occurs but under a clear sky.

As to the ground-gru, observed by Colonel Jackson in the Neva under three feet of ice and three feet of snow, that can form no valid objection to the explanation I have given, unless it were ascertained that the gru was formed after the surface ice and the fall of the snow, and not before them. All rivers issuing from lakes, like the Neva, have very clear waters to admit of radiation through them, although as deep as it is; and all rivers are very clear during frost, owing to the freezing up of the little land rills that would convey earthy particles into them. Ground-gru formed in the Neva would be much more permanent than in our rivers. The mean temperature of Alford

is 45° Fahr., and that of the earth, of course, the same; and on the remission of its cause, the ground-gru is here speedily detached from the bottom, by the transmission of heat from below. Not so in the Neva. There, according to Kupffer, the mean temperature is only 38°.75; and under the action of a frost so severe as to form three feet depth of ice, although the condition of the clear sky might not continue, previously formed gru would, at that mean temperature, be of great permanence. This applies also to the Siberian rivers.



VII.—*The Foundations of Geometry — Presidential Address to Section III.*

By PROFESSOR ALFRED BAKER, M.A.

(Read May 22nd, 1906).

It is satisfactory to know that the advances that are being made in the purely intellectual domain of mathematics are, in a sense, comparable with the remarkable achievements of the physicist and of the chemist, though necessarily appealing to a more limited circle, and less encouraged by the stimulating influence of popular applause. In mathematics activity shows itself in two directions—the boundaries of the science are being enlarged, and its foundations are being subjected to the most searching examination. In analysis the examination of the number concept has produced many remarkable results; in geometry the search-light of a penetrating logic has revealed the base of the subject with remarkable clearness. It is of this latter field of enquiry—the foundations of geometry—I wish to speak.

In Euclid each proposition rests on preceding propositions, and the reasoning is unassailable. But when we go down to the lowest stones of the structure—to the axioms—we find ourselves in serious difficulties. Every intelligent schoolboy has had his trouble with the eleventh axiom, respecting parallel lines, and it has puzzled many a philosopher. It has been claimed that Euclid reckoned it amongst his postulates; and certainly, if its self-evidence had never been asserted, and if the assumption implied in it had been asked as a concession, the nature of the foundation of the science of geometry would have been much more clearly revealed, and much useless labour would have been saved. Everyone is more or less acquainted with the struggles to prove this axiom. Perhaps nothing reveals the subtlety of the subject better than the well-known story told of the great Lagrange. Observing that the formulæ of spherical trigonometry did not depend on the eleventh axiom, Lagrange thought to develop a proof of the axiom based on this fact. He prepared his paper and actually began to read it before the Academy. Suddenly stopping, he said, “Il faut que j’y songe encore,” put the paper in his pocket, and never afterwards referred to the matter, at least in public.

The search for the unattainable was closed by the labours of Gauss, Bolyai, Lobachevski and Riemann, the pioneers undoubtedly being

Lobachevski and Bolyai. These mathematicians showed the existence of perfectly consistent systems of geometry in which the eleventh axiom did not hold. It followed, therefore, that this axiom could not be a consequence of the other Euclidean axioms, and that, accordingly, all efforts to prove it must necessarily be fruitless. This axiom is thus shown to be a fact of *observation*, and geometry becomes a branch of natural science. In our space, the Euclidean space, parabolic space as it has been called, only one straight line in a plane can be drawn through a given point parallel to a given straight line; in the space of Lobachevski, hyperbolic space, an infinite number of such lines can be drawn; and in the space of Riemann, elliptic space, no such lines can be drawn,—there are no parallels, no lines that do not meet.

There is a letter written in 1799 by Gauss to the elder Bolyai from which it appears that Gauss was at that time occupied with the foundations of geometry.

Lobachevski views were first published in a lecture given before the Faculty of Mathematics and Physics of the University of Kasan, February 26th, 1826.

Gauss in a letter to Bessel (January 27th, 1829) states that the foundations of geometry cannot be established *a priori*, and there appears reason to believe his researches were along the line of those of Lobachevski and Bolyai. These researches, however, were never published.

Wolfgang Bolyai in 1832-3 published a two volume work on mathematics, and at the end of the first volume occurred an appendix, a memoir written by Johann Bolyai in 1823, in which the theory of parallels was developed along the same lines as Lobachevski followed.

Riemann's "Über die Hypothesen welche der Geometrie zu Grunde liegen" was published in 1854.

In a letter to his father, written November 3rd, 1823, the younger Bolyai claims that "from nothing he had created another wholly new world," and so in a sense he had.

The remarkable discoveries of Lobachevski and Bolyai passed practically unnoticed until the attention of the mathematical world was directed to them by Riemann and Baltzer, about 1866: This then may be considered the date at which the vision of mathematicians was cleared in respect to the foundations of geometry so far as the so-called parallel axiom is concerned.

But all difficulties respecting the foundations of geometry were by no means thus disposed of. The discovery of the space of Lobachevski made men doubtful of final principles. They found themselves existing between two kinds of space entirely different from their own,—

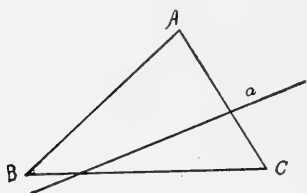
that of Lobachevski, and that of Riemann. Then the question of four-dimensioned space broadened men's visions. Riemann, Helmholtz and Lie conceived space as a manifold of numbers. The pseudosphere of Beltrami, mathematically possible, physically inconceivable, helped along distrust in our geometry of experience. It is scarcely necessary to say that in Euclid's system of geometry there is a continual covert reference to the physical universe of experience; especially is this so in the constant use of diagrams. The result of this mental unrest was that it was strongly felt the whole question of the foundations of geometry was in the melting pot, and that something very different from Euclid's system of axioms had to be devised to constitute an unassailable and perfectly logical set of first principles or assumptions from which to make a beginning.

The importance of establishing the science of geometry with logical accuracy, on a purely rational basis, suppressing completely the role played by experience, will readily be conceived. Philosophically, of course, it is essential in our search for that ideal perfection with which alone we are content. We must remember also that geometry, the science of the external relations of things, is at the base of dynamics, optics, and other physical sciences, and in laying its foundations securely we are laying theirs. We are also, as in effect I have already said, making a searching and critical examination of those intuitions which lie at the very foundations of our intellectual life, namely, those relating to space.

In connection with the unveiling of the Gauss-Weber monument at Göttingen a memorial volume was published, part of which consisted of Professor Hilbert's "*Grundlagen der Geometrie*," or "*Foundations of Geometry*." It is dated 1899. His ideas have been developed by Professor George Bruce Halsted of Kenyon College, Gambier, Ohio, who calls his work "*Rational Geometry, a Text-Book for the Science of Space*."¹ It is of this system of geometry that I propose to speak. If Hilbert has shown great subtlety of analysis in discussing the necessary and sufficient assumptions that may be made the basis of geometry, Halsted has shown consummate ability in the development of those assumptions, and I feel bound to divide my admiration between the two geometers.

¹*Rational Geometry, a Text-book for the Science of Space, based on Hilbert's Foundations*, by George Bruce Halsted, New York, John Wiley & Sons, 1904.

Before I enter with any detail into an explanation of this rational geometry, that you may understand at once how much more fundamental it is than the system of Euclid, and how much more rigorously it seeks to exclude our experimental knowledge of the physical world, let me mention some of the assumptions and deductions of the system:—



Assumption.—"If A, B, C are points on a straight line, and B lies between A and C, then B lies also between C and A."

Assumption.—"A, B, C are three points not co-straight. If a line, *a*, cuts the sect A C, then it also cuts the sect A B or the sect C B."

Theorem.—"Every straight line *a* which lies in a plane separates the plane into two regions such that every point A of one region with every point B of the other region determines a sect A B within which lies a point of the straight line *a*; and any two points A, A' of the same region determine a sect A A' which contains no point of *a*."

Theorem.—"No straight line can lie wholly within a triangle."

Now, with a view to placing my hearers in the position of isolation necessary for an appreciation of the assumptions at the base of Hilbert's geometry, with the purpose of suggesting to them the degree of abstraction with which the subject must be approached, let me briefly outline a purely abstract geometry:—

A point may be defined to be that which is determined by two numbers, x and y . (I am not in the least suggesting the Cartesian method with its co-ordinate axes). We may suppose a straight line to be defined as that which is determined by two ratios, $u : v : w$, still without the suggestion of physical representation. Further, we may say that such a point (x, y) is said to lie on such a line $u : v : w$ when the equation $ux + vy + w = 0$ is satisfied. But with such a basis, when three points (x_1, y_1) , (x_2, y_2) , (x_3, y_3) lie on such a line, how can we say that one point lies 'between' the other two? Clearly some convention must be adopted, possibly with respect to the magnitudes of the numbers, the x 's or the y 's, without which there is no such thing necessarily as 'betweenness'. And with such a basis how can we speak of the 'sides' of such a line? Clearly some convention must be adopted, possibly that all points which make $ux + vy + w$ positive shall be said to lie on one side of the line, and all points that make it negative shall be said to lie on the other side. I do not say

that Hilbert's geometry is as abstract as the preceding suggests, but I do say that it must be clearly borne in mind that all our knowledge of the elements in Hilbert's geometry must be derived from the assumption we make regarding them, and not in any way from our physical experience of points, lines, etc.

Again, since Hilbert proposes to *create* by his assumptions (not axioms, which here I feel to be an unsuitable word) a geometrical universe, it seems reasonable to anticipate that his assumptions will be more numerous than the axioms of Euclid who, in formulating these axioms but incompletely analyzed a universe already in existence.

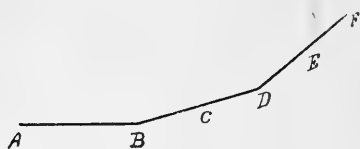
Still further,—Our knowledge of the external universe is a knowledge of relations. The universe defines itself to us by means of relations. We might anticipate then that Hilbert in presenting to us the universe he brings into existence, and in seeking to make us conceive it, would not begin by attempting to define such elements as the point, line and plane, but would confine himself to making assumptions respecting their relations.

With this preface I proceed to state Hilbert's assumptions, giving also, by way of illustration, as such illustration seems necessary for a proper understanding and appreciation of the assumptions, certain of Halsted's deductions.

Hilbert begins by saying, let us consider three distinct systems of things, calling them respectively, *points*, *straight lines*, and *planes*. We think of these as having certain relations, and the complete and exact description of these relations are the consequences of the assumptions of geometry. He then makes these assumptions, dividing them into five groups: I. Assumptions of connection or association; II. Assumptions of order or betweenness; III. Assumptions of congruence; IV. Assumption of parallels; V. Assumption of continuity, or Archimedes' axiom.

I. The assumptions of association are:—

- (1). Two points determine a straight line.
- (2). Any two points on a straight line determine it.
- (3). On every straight line there are at least two points.
- (4). Three points determine a plane.
- (5). Any three points (not co-straight) on a plane determine it.
- (6). On every plane there are least three points (not co-straight).
- (7). If two planes have one point in common they have another.
- (8). If two points on a straight line lie on a plane, then every point on the straight line lies on the plane.



The meaning of (1) is that two points determine a straight line completely, and determine only one straight line. Yet (2) is necessary. For while A, B might uniquely determine A B C D, still C D might uniquely determine C D E F. The same consideration shows the need of both (4) and (5).

The assumption "any two points on a straight line determine it" is the co-relative in this system of geometry of the familiar axiom "Two straight lines cannot enclose a space." Yet it is evidently more elementary than the latter; it makes no such assumption as is implied in the word "enclose."

The conception of a line as having an infinite number of points on it, and the conception of a plane as having an infinite number of lines and points on it, are not implied in the preceding assumptions. They will appear later as deductions from the assumptions respecting "betweenness."

Consideration will show that it is not necessary to physically conceive the elements point, line and plane, difficult though it may be to avoid doing so. Hilbert has not discussed this matter in the published reproduction of his lectures, whatever he may have done in the lectures themselves. I conjecture that he felt it proper that each student should impart to the subject the degree of abstraction he felt possible by reason of his mental make-up. It is to be borne in mind, however, that the object of this geometry is to get away from the evidence of our senses by reason of the doubt which the mind casts on the reliability of such evidence. Strictly speaking, the subject is a purely logical one, though, I think, throughout its study we are expected to note the complete correspondence between the conclusions we reach and the facts of the physical universe.

We have no difficulty in making deductions from the preceding assumptions:—

Theorem 1.—Two straight lines cannot have two points in common. For since the two points determine a straight line uniquely [(1), (2)], there can be only one straight line through these two points.

Theorem 2.—Two planes have no point in common, or they have a straight line in common. For if they have one point in common they have a second point in common, [(7)]; and, therefore, each contains the straight line which is determined by these two points [(8), (2)].

Theorem 3.—Two planes cannot have two straight lines in common. For if they have, on each line there are two points [(3)]; and three points determine a plane [(5)]. Therefore, there is but one plane.

Theorem 4.—A straight line and a point not on it determine a plane. For on the line are two points [(3)]; and these with the given point determine a plane [(5)] on which every point on the line lies [(8)].

Theorem 5.—If a plane contains a straight line and a point in another straight line, but not such other straight line, then no plane can contain both lines. For a plane containing both lines would contain the first line and the point on the second, and, therefore, would be identical with the first plane (Thm. 4), which by hypothesis does not contain the second line.

II. The assumptions of betweenness are:—

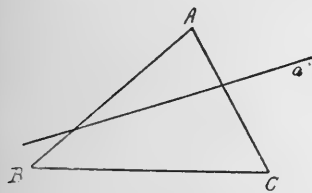
(1). If A, B, C be points on a straight line, and B lies between A and C, then it also lies between C and A.

(2). If A and C be points on a straight line, then there is at least one point B on the line between A and C, and also one point D on the line such that C lies between A and D.

(3). Of three points on a straight line one and only one lies between the other two.

(4). *Pasch's assumption.*—Let A, B, C be three points not co-straight, and a a straight line in the plane ABC but going through none of the points A, B, C. Then if a goes through a point within the sect AB, it must also go through a point within the sect AC, or a point within the sect BC.

The first three assumptions are intended to fix the fact that points exist on a straight line in a certain order.



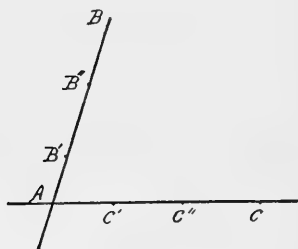
It is important to observe that no such idea has been introduced as that the points on a line are continuous; or that we cannot get from one 'side' of a line to the other without 'passing through' or 'cutting' the line. If we are to reach such a fact evidently it must come to us from assumption (4). Indeed, it will be noted that, compared with assumptions (1), (2) and (3), there is a startling complexity in assumption (4); and we receive it in much the same way as we recollect receiving the eleventh axiom of Euclid. One feels that the founder of this geometry must have introduced it with reluctance, and only after a struggle to find a substitute; and yet one feels that

it is an assumption from which important results must follow. The existence of such a foundation stone as (4) may seem to be one of the reasons for preferring 'assumption' to 'axiom,' since in point of elementariness (1), (2) and (3) seem to be in a class different from (4). The real reason, however, for preferring "assumption" is that "axiomatic" and "self-evident" have come to be regarded as synonymous, and in the latter word, in such a connection, there seems to be a reference to our experiential knowledge. The demand, also, that the 'axioms' of Euclid be conceded is certainly an appeal to our experiential knowledge. Thus it is that the word 'axiom' does not suggest the ground on which these foundation stones are introduced into this system of geometry, or their relation to the system. The word "assumption" on the other hand, is not suggestive of self-evidentness or of any appeal to previous knowledge. It is important to keep this point clearly in mind, otherwise the whole spirit of this system of geometry may be lost sight of.

From the preceding assumptions we see that there is an unlimited number of points on a straight line, of straight lines in a plane, and of planes in space.

For from (2) we see there is an unlimited number of points on a straight line.

Also A, B, C being [I, (6)] three points on a plane, not co-straight, then A, B determine one straight line and A, C another. On each of these lines there is an unlimited number of points, and every different combination of a point on one with a point on another determines a different straight line. For the line determined by B', C' could not be the line determined by B', C'. If it were, then

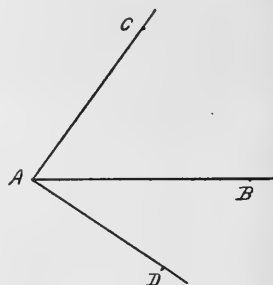


each would be both of the lines A B and A C [I. (2)], and the points A, B, C would be co-straight, which is contrary to hypothesis.

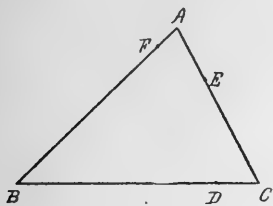
Similarly A, B, C, D being four non-co-planar points we reach an unlimited number of planes in space.

Theorem 6.—A, B, C are three non-co-straight points. Then a straight line cannot have points within all three sects B C, C A, A B

For let D, E, F be points of such a straight line. Of the three points D, E, F, one of them, say E, must be between the other two [II. (3)].



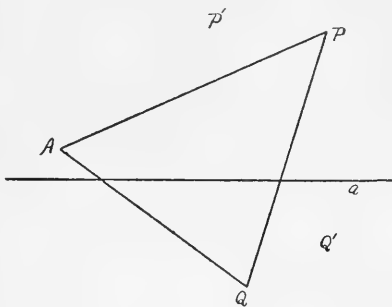
Then [II. (4)] $A C$, through E , must have a point in common with $D B$ or $F B$. That is, $A C$ meets $B C$ or $B A$ in two points, which is impossible [Thm. 1].



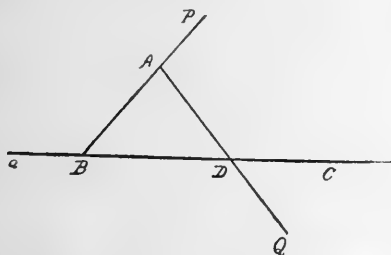
And now we reach a theorem from which we first realize that a line has "sides," and that it divides a plane in the way in which in Euclid, without hesitation, we assume, it divides the plane.

Theorem 7.—Every straight line a in a plane divides the plane into two regions such that all points P, P', \dots of one region determine sects that have no points in common with a ; and all points Q, Q', \dots of the other region determine sects that have no point in common with a ; but every one of the points P, P', \dots of one region determines with every one of the points Q, Q', \dots of the other region a sect that has a point in common with a .

Let A be a point not in a ; and let $P, P' \dots$ be points such that the sects $A P, A P', \dots$ have no point in common with a ; also let Q, Q', \dots be points such that $A Q, A Q', \dots$ have points in common with a . Then if a had a point in common with $P P'$, it would have a point in common with $A P$ or $A P'$ [II., (4)], which by hypothesis it has not. Hence $P P'$ has no point in common with a . Again, since $A Q, A Q'$ have points in common with a , therefore, $Q Q'$ has no point in common with a [Thm. 6]. Also since $A Q$ has a point in common with a , and $A P$ no point in common with a ; therefore, $P Q$ has a point in common with a [II., (4)].



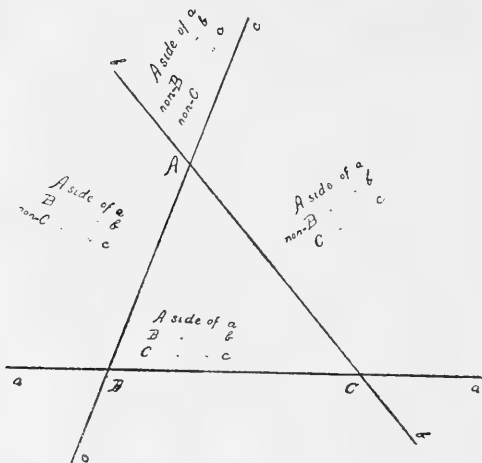
It is here assumed that A being taken not in a , there are points giving sects with points in common with a , and others not having such common points. This can readily be proved:



For $B C$ [I, (3)] being points on a , there exists a point P in $B A$ such that A lies between P and B [II, (2)]; and, therefore, $A P$ has no point in common with a . Again, between B, C there exists on a a point D [II, (2)]; and on the straight line determined by A, D there exists

a point Q such that D lies between A and Q [II, (2)]. Hence $A Q$ has a point in common with a .

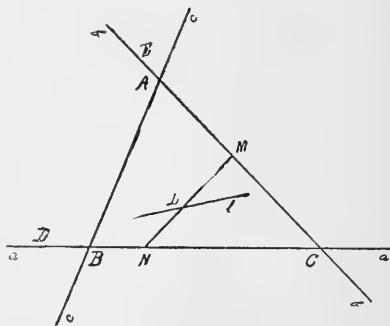
Every triangle divides the plane into two regions. There is the region which lies on the *A* side of *a*, the *B* side of *b*, and the *C* side of *c*, which we may speak of as the region within the triangle; and there is the rest of the plane constituting the other region. Evidently in passing from one of these regions to the other we pass from one side to the other of at least one of the straight lines *a*, *b*, *c*; and therefore our sect-train has a point in common with one of the sects *A B*, *B C* or *C A* [Thm. 7].



Theorem 8.—There are straight lines wholly without a triangle and in its plane; and no straight line is wholly within a triangle.

For the straight line determined by the points *D* and *E* cannot again meet *a* or *b*. Nor can it meet *A B* for then [II, (4)] it would meet *A C* or *B C*, i.e., would again meet *b* or *a*.

Again, any straight line (*l*) through *L*, a point within the triangle, has also a point on the side. For another line through *L*, and also through *M*, has a point on another side, say *N* on *B C* [II, (4)]. Hence *l*, through a point on *M N*, a side of the triangle *M N C*, must also have a point in common with either *C M* or *C N*, i.e., with *A C* or *B C* [II, (4)]. Hence, too, cutting *A C* or *B C*, it must [II, (4)] cut another side also.



III. The assumptions of congruence.

We might, in a measure, describe conditions here by saying that the fundamental principle is uniqueness,—the principle of there-is-only-one-such.

(1). If *A*, *B* be points on a straight line *a*, and *A'* a point on straight line *a'*. Then on *a'*, on one of the two rays from *A'*, we can find only one point *B'*, such that the sect *A' B'* is congruent to sect *A B*. Written $A B \equiv A' B'$.

Every sect is congruent to itself. The sect AB is congruent to the sect BA .

The assumption means that a given sect can be taken on a given straight line, and on a given side of a given point, in one and only one way.

(2). Scts that are congruent to the same sct are congruent to one another.

(3). If AB , BC be two scts on the same straight line and without common points except B , and likewise $A'B'$, $B'C'$ two scts on the same straight line and without common points except B' , if $AB \equiv A'B'$ and $BC \equiv B'C'$, then is $AC \equiv A'C'$.

(4). There is in a plane, and on the same side of $B'C'$, only one ray $B'A'$ such that the angle $A'B'C'$ is congruent to the angle ABC . Written $\angle A'B'C' \equiv \angle ABC$.

Every angle is congruent to itself. Also $\angle ABC \equiv \angle CBA$.

This assumption means that in a given plane every angle can be laid off towards a given side, against a given ray, in one and only one way.

(5). Angles that are congruent to the same angle are congruent to one another.

(6). If A , B , C be three points, and $A'B'C'$ three other points, and if $AB \equiv A'B'$, $AC \equiv A'C'$, and $\angle BAC \equiv \angle B'A'C'$, then $\angle ABC \equiv \angle A'B'C'$, and $\angle ACB \equiv \angle A'C'B'$.

Here again, in (6), we are startled by the assumption which, I think, no one would speak of as a self-evident truth, just as we were startled by Pasch's assumption, and in the long ago by Euclid's eleventh axiom. It is no more apparent that $\angle ABC \equiv \angle A'B'C'$, than that $BC \equiv B'C'$. However, we are justified in assuming what is necessary, but not in assuming more than is necessary; and with the assumption of (6) we shall see that we are able to prove $BC \equiv B'C'$.

Theorem 9.—In two triangles ABC , $A'B'C'$, if $AB \equiv A'B'$, $AC \equiv A'C'$ and $\angle BAC \equiv \angle B'A'C'$, then is $BC \equiv B'C'$.



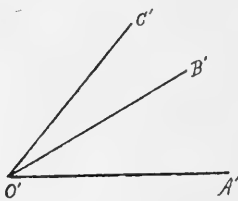
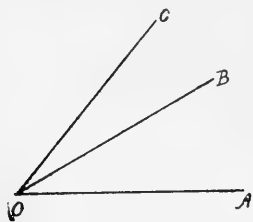
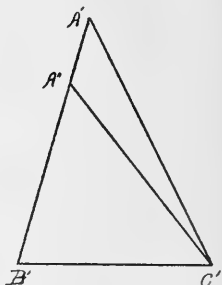
For by (6) $\angle ABC \equiv \angle A'B'C'$. Take then $B'C''$ congruent to BC . Then in triangles ABC , $A'B'C''$ we have $AB \equiv A'B'$, $BC \equiv B'C''$, $\angle ABC \equiv \angle A'B'C''$. Therefore by (6) $\angle BAC \equiv \angle B'A'C''$.

But by hypothesis $\angle BAC \equiv \angle B'A'C'$. Hence [III, (5)] $\angle B'A'C' \equiv \angle B'A'C''$, which by III, (4), is impossible. Hence $BC \equiv B'C'$.

Theorem 10.—Two triangles are congruent if a side in each and the adjacent angles are congruent.

Let $BC \equiv B'C'$, $\angle ABC \equiv \angle A'B'C'$, $\angle ACB \equiv \angle A'C'B'$.

If AB be not $\equiv A'B'$, take $B'A'' \equiv BA$. Then [Thm. 9] the triangles ABC , $A'B'C'$ are congruent, and therefore $\angle ACB \equiv \angle A'C'B'$. But $\angle ACB \equiv \angle A'C'B'$. Therefore [III., (5)] $\angle B'C'A'' \equiv \angle B'C'A'$, which is contrary to III., (4). Hence $AB \equiv A'B'$, and therefore [Thm. 9] the triangles are congruent.

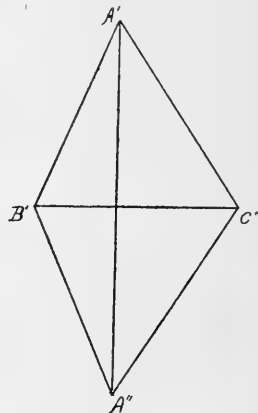
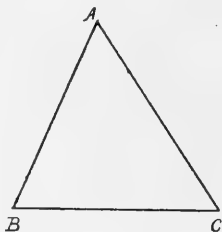


After shewing that if $\angle AOB \equiv \angle A'O'B'$ and $\angle BOC \equiv \angle B'O'C'$, then $\angle AOC \equiv \angle A'O'C'$; and also that the angles at the base of an isosceles triangle are congruent,

we are able to shew that if the three sides of one triangle are respectively congruent to the three sides of another, the triangles are congruent :

Let $\angle C'B'A'' \equiv \angle CBA$, and $B'A'' \equiv BA$.

Then triangles ABC , $A'B'C'$ are congruent. Therefore $\angle B'A'A'' \equiv \angle B'A'A'$, and $\angle C'A'A'' \equiv \angle C'A'A'$. Therefore $\angle B'A'C' \equiv \angle B'A''C' \equiv \angle BAC$; and the triangles ABC , $A'B'C'$ are congruent [Thm. 9].



From the above we see that if A' , B' , C' be three non-co-straight points, a point A'' exists such that $A''B' \equiv A'B'$ and $A''C' \equiv A'C'$.

We may also reach the general proposition that if $ABC \dots$, $A'B'C' \dots$ be congruent figures, and P any point whatever, then there exists a point P' , such that the figures $ABC \dots P$, $A'B'C' \dots P'$ are

congruent; also if $A B C \dots P$ contains four non-co-planar points, then the construction of P' is possible in only one way.

With this general proposition before us we see that the facts of congruence are resolvable into "assumptions of congruence" as elements. Or we may express the same idea by saying that the question of the possible existence of two distinct congruent associations of points is shown to be resolvable into the elementary "assumptions of congruence" given above. In consequence, Professor Halsted says that we thus "found the idea of motion upon the congruence assumptions"; and Sommer of Göttingen, in his review of Hilbert's "Grundlagen der Geometrie," (Bulletin, Am. Math. Soc., Vol. vi, p. 289), speaks of the definition of motion as based on the assumptions of congruence. It is, however, of importance to note that the words of Hilbert are, "All the facts concerning space which have reference to congruence, that is to say, to displacements in space, are exclusively the consequences of the six assumptions of congruences." Hilbert, therefore, here says in effect that congruence is displacement. When, as above, we state the congruence idea with reference to a system of points, we are stating it with reference to any rigid body. We, however, are conveying the idea of all its force, though in the simpler form, in the very first of the assumptions of congruence, that respecting two sects. I think we may admit that there is a sense, in the purely rational geometry of Hilbert, in which the idea of congruence precedes the idea of motion. For, indeed, Hilbert has so arranged it. We admit that there is a sect congruent to $A B$ in all positions. We conclude, therefore, that space is such as to admit of the transference of $A B$ to any position, *i.e.*, we reach the idea of motion. If, however, we are dealing with a geometry into which experience in the least enters, the existence elsewhere of a sect congruent to $A B$ seems to me to depend on the idea that $A B$ may be transferred anywhere; *i.e.*, the idea of motion precedes the idea of congruence. The matter is of interest since, on the ground that the idea of congruence precedes the idea of motion, Professor Halsted protests against the use of superposition in proving theorems in congruence, as we do, for example, in proving the congruence of triangles in our ordinary elementary geometry. He says "to prove the congruence assumptions and theorems with the help of the motion idea, is false and fallacious, since the intuition of rigid motion involves, contains and uses the congruence idea."

PARALLELS.

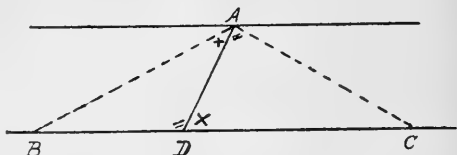
The definition of parallels is that they are coplanar straight lines with no common point.

It is then possible to show that through a given point (A) without a given straight line (BC), there is always one straight line parallel to the given one (BC).

For let $\angle DAB \equiv \angle ADC$, and suppose that AB meets CB.

Let DC be $\equiv AB$. Then the triangles B A D, C D A are con-

gruent, and the angles similarly marked are equal. Hence the angles at A are 'adjacent angles,' and we should have the straight line B A C meeting BC in two points.



IV. Assumption of parallels.

It is then assumed that,—

Through a given point there is not more than one parallel to a given straight line.

The geometry is thus made Euclidean.

V. Assumption of continuity.

Finally there is the assumption of continuity, frequently spoken of as the axiom of Archimedes:—

If A_1 be any point on a straight line between any given points A and B; and the points A_2, A_3, \dots be taken on the line such that A_1 lies between A and A_2 , A_2 between A_1 and A_3 , etc.; and such that the sects AA_1, A_1A_2, \dots are all congruent; then in the series of points A_2, A_3, \dots there is always a point A_n such that B lies between A and A_n .

This makes possible the introduction into geometry of the idea of continuity, and is the expression of the idea of continuity in terms of a sect calculus. It claims that the magnitudes with which we deal in geometry are continuous.

The statement of this principle by Archimedes constitutes his fifth assumption and is as follows: "Further, of unequal lines, unequal surfaces, and unequal solids, the greater exceeds the less by such a magnitude as, when added to itself, can be made to exceed any assigned magnitude among those which are comparable with one another." It will be remembered that Euclid in his definitions (Def. 4, Bk. V); says, "Magnitudes are said to have a ratio to one another when the less can be multiplied so as to exceed the greater." Proposition 1 of Book X, Euclid, which constitutes Lemma 1 of Book XII, is as follows: "If from the greater of two unequal magnitudes there be taken more than its half, and from the remainder more than its half, and so on; there shall at length remain a magnitude less than the least

of the proposed magnitudes." In the demonstration of this Lemma, Euclid says, "For C (the less of the magnitudes) may be multiplied so as at length to become greater than A B (the greater of the magnitudes)," which is a statement of this principle of continuity, and which Euclid evidently bases on Definition 4, Book V. Euclid uses this Lemma in the demonstration of Prop. 2, Book XII, "Circles are to one another as the squares on their diameters," and Archimedes frequently assumes it. Indeed, it constitutes the foundation of the Method of Exhaustions from which descended our Infinitesimal Calculus. I have thought this historical reference worth making that the place this assumption of Archimedes occupies in science may be the more manifest.

Such then are the assumptions which Hilbert makes the foundations of geometry. It will be observed that they all refer to geometrical magnitude, whereas, of the axioms of Euclid only three are really geometrical,—the eighth (magnitudes which coincide are equal), the eleventh, and the twelfth (two straight lines cannot enclose a finite space), the tenth (all right angles are equal to one another) being capable of proof.

It is, of course, essential that these assumptions should be (1) consistent with one another, and (2) independent of one another. First with respect to the question of consistency: "As geometry is built up by the indefinitely repeated application of the axioms, the possibility is not excluded that a contradiction might appear only after an unlimited repetition of such application" (Sommer, Bulletin, Am. Math. Soc., Vol. VI, p. 291). To settle the question Hilbert translates his groups of assumptions into the domain of numbers, the number concept being presumably entirely abstract, and, therefore, independent of experience. Any inconsistency would then appear in the arithmetical form of the assumptions, and the search may be a possible performance. Next, with respect to the independence of the assumptions of one another: The examination is here made by leaving out each assumption in turn, and showing that without it a perfectly independent and consistent system of geometry can be constructed in which the omitted assumption does not hold. The method, of course, is suggested by the way in which non-Euclidean geometry has been built up.

Professor Hilsed's presentation of Hilbert's system of geometry, a presentation which, having regard to the newness of the ideas, must be spoken of as consummately able, has been undertaken with a view to popularizing this rational geometry. I conjecture that most educators will think it impossible for school purposes. Let me, however,

recall a mathematical story: "About 1570 Sir Henry Savile, warden of Merton College, endeavoured to create an interest in mathematical studies by giving a course of lectures on Greek geometry . . . On concluding the course he used the following language: 'By the grace of God, gentlemen hearers, I have performed my promise; I have redeemed my pledge. I have explained, according to my ability, the definitions, postulates, axioms, and the first eight propositions of the elements of Euclid. Here, sinking under the weight of years, I lay down my art and my instruments'" (Cajori, p. 281). If in 1570 the work named was the possible performance of university students, while to-day schoolboys accomplish the six books of Euclid, or their equivalent, surely a time may come when schoolboys will find no difficulty with the abstractions of Hilbert's geometry, and the truth of Professor Halsted's claim may be felt, that "Geometry at last made rigorous is also thereby made more simple."

VIII.—*Temperature Records of Nocturnal Radiation.*

By HOWARD T. BARNES, D.Sc.

Associate Professor of Physics, McGill University, Montreal.

(Read May 23rd, 1906).

The problem of the nocturnal cooling of the atmosphere and the earth is one of such importance in meteorology that it has attracted the attention of many investigators.

On clear nights the surface of the earth is cooled by emission of heat into space. The temperature of the lower layers of air fall, and being heavier remain on the ground. It has been shown by Tyndall and others that pure dry air is almost completely diathermanous to heat waves, and hence, during a clear, cold night in winter, very little, if any, radiation takes place from the air to the sky.

We know also that the character of the radiation from the earth into space must be different to the forms of radiation usually studied, such as that from a heated body to the face of a thermophile. The radiation from a low temperature source, such as a surface at 100° , is composed of a greater proportion of long heat rays than the radiation from a high temperature source, such as an incandescent mantle, or arc light. Little or nothing is known of the character of the radiation from a cold surface, such as the earth in winter, to the absolute cold of space. The inadequacy of applying the results obtained in a study of the radiation from hot bodies to the problems of nocturnal radiation is at once apparent.

So difficult is the treatment of the problem that very little has at present been done.

Dr. S. Tetsu Tamura has shown this very well in a paper on the Mathematical Theory of the Nocturnal Cooling of the Atmosphere¹ in which he gives a careful historical survey of the various experimental results that have been obtained.

HISTORICAL.

In 1783, Patrick Wilson² of Glasgow, suspended a mercury thermometer, at a height of about four feet above the surface of the snow in an open field, under a clear sky and calm atmosphere, at night. A second thermometer was placed on the snow surface. He observed on one occasion a difference of six degrees Fahrenheit between the two thermometers. The one on the snow read -21.7° Fahr., and the one

¹ Monthly Weather Review 33 p. 138 (1905).² Phil. Trans. Roy. Soc. Edin. I p. 153, 1783.

suspended in the air read -15.0° Fahr. The difference diminished rapidly when clouds appeared on the horizon, and vanished when the sky was completely covered. Wilson also was the first to show that the radiation of bodies towards the sky is practically the same at all temperatures of the air.

In 1794, Six showed that the radiation from the grass on a meadow during calm and clear nights was sufficient to cool a thermometer below one suspended five or six feet above it. In one case he reports a difference of 7.5° Fahr.

About the beginning of 1800, Dr. Wells made a careful study of the earth's radiation at night. He placed thermometers in contact with the ground and leaves of plants as well as enveloping the bulbs in wool or cotton. These thermometers placed at a small distance from the earth's surface gave a fall of 4.5° Fahr., and even 7.8° Fahr. below a similar thermometer uncovered and suspended at a height of four feet.

Differences of 8° and 9° Fahr. were obtained by Pouillet, in 1844, who repeated Wells' experiments.

In 1847 the experiments of Melloni were performed. On account of his classical researches in the domain of radiant heat he was well fitted to investigate the problem of terrestrial radiation.

He came to the conclusion that the cooling of a black thermometer is owing to radiation, and that the radiation from a metallic thermometer was too small to be observed.

Nearly all of our knowledge of the radiation of heat has been obtained from researches with high temperature sources where the proportion of short waves and visible rays is very much larger than from low temperature sources.

The diathermaney of many substances for rays from incandescent bodies was studied by Melloni and his table is familiar to everyone. The same investigator extended his study to the radiation from a copper ball heated to 400° Cent., and to that from the face of a Leslie cube containing boiling water.

It was found that many substances, which allowed a considerable proportion of the high temperature radiation, including the light rays to penetrate, were opaque to the rays of a low temperature source.

In general we find that the higher the temperature the more of the short waves are produced and the less of the long waves. A study of the very long heat waves is a matter of great interest on account of the relation which these waves have to electrical waves.

A good deal of attention has been devoted of late to separating out the long waves from a source of radiation and determining the properties of these waves.

It was found that by successive reflection of the heat waves on quartz or sylvine surfaces that very long waves could be isolated and studied.

A very good statement of the limits of our present knowledge in regard to the long heat waves has been given by Professor E. F. Nichols, of the University of Columbia, in a paper entitled, *The Unobtained Wave Lengths between the Longest Thermal and the Shortest Electric Waves yet Measured*, which was presented at the International Electrical Congress at St. Louis in 1904. In considering the present boundaries he points out the great advance which has been made in the measurement of the long waves by successive reflection from crystalline surfaces, such as quartz. After five reflections on sylvine surfaces, waves of $61\ \mu$ in length have been isolated and measured. In character these long waves resemble electric waves more closely than they do light waves. All metallic surfaces reflect them about equally and almost entirely. The relations between reflecting power and electric conductivity and between refractive index and dielectric constant hold more rigidly than in light waves. It has been possible to demonstrate with conducting areas of suitable dimensions the same laws of resonance for heat waves which were known previously only for electric waves.

Professor Nichols further questions how much farther the method of isolation by multiple reflection which has yielded so much can be carried. Substances are known which should have regions of absorption and metallic reflection beyond $60\ \mu$; but the difficulty of experimenting is very great. Rubens has calculated that from a black body at 2000°C . the intensity of the radiation of waves of the length of $1.5\ \mu$ is 800,000 times greater than for waves of $60\ \mu$. If the total energy between wave lengths $50\ \mu$ and $60\ \mu$ be taken as unity, the total energy between $60\ \mu$ and $100\ \mu$ will be 0.7, and between $100\ \mu$ and $1000\ \mu$ only about 0.2.

It will be seen then how small a proportion of the very long waves exist compared to the shorter waves. Turning to the electric spectrum, Professor Nichols points out that, beginning with the 60 cm. waves of Hertz, Righi, Lebedew and Lampa have successively reduced them. Lampa, using an apparatus differing in no essential respect from the infra-red grating spectrometer, was able to obtain and make measurement with waves only 4 mm. long.

Summing up the complete ether spectrum, Professor Nichols shows, beginning with Schumann's and Lyman's short ultra-violet waves of the order of $0.1\ \mu$, that we have about two octaves in the ultra-violet, one in the visible, and six in the infra-red spectrum, making nine in all. The shortest electric waves yet produced begin about six octaves

lower in the scale. I show in Fig. 1 a diagram of the ether spectrum, as we now know it, which illustrates very well the relation of the known ether waves.

TERRESTRIAL RADIATION.

It is probable that the radiation from the earth's surface consists of a large proportion of the long heat waves.

On a clear, cold night in an arctic winter the character of the radiation into space at the absolute zero of temperature (-273° C.) must be of much interest.

The problem is of importance in considering the formation of ice in our lakes and rivers, but on account of the difficulty of applying any of the known laws of heat radiation to it, the matter is exceedingly difficult to treat at all completely.

Thus, it was shown by Melloni and Tyndall that water and ice are both opaque to the radiation from a low temperature source, such

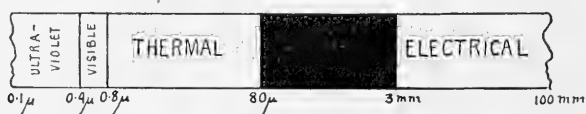


FIG. 1. SPECTRUM OF ETHER WAVES, THE DARK PORTION SHOWING THE UNEXPLORED REGION.

as a copper ball heated to 400° C. or to 100° C. At the same time, we know that ice formation goes on in a river through quite large masses of water and ice, when clear and free from surface snow. Anchor-ice forms at the bottom of a river, under circumstances which leave no doubt that radiation has given rise to its production. The absorption of the heat waves by water has been traced by Rubens and Aschkinass in 1898, to waves as long as 60μ . It is likely then that the radiation which is responsible for the production of anchor-ice must be beyond 60μ , and well into the unexplored region. Drude¹ has shown that water is opaque to electrical waves of 9 centimetres, but transmits waves of 60 cm. in length. A region of transparency must be then between waves $.060\text{ mm.}$ and 90 mm. , to be followed by another at 600 mm. The radiation from the earth consists probably of a large proportion of the waves in the unexplored region between the longest thermal and shortest electrical waves yet measured.

EXPERIMENTAL.

As a continuation of my studies of anchor-ice formation it was decided to determine, if possible, the amount of penetration of the

¹ Drude, Wied. Ann. 65, 499 (1898).

earth's radiation through water and clear ice. To do this two exactly similar platinum thermometers were constructed from flat mica plates 10 x 4 cm. in size. The wire, 50 ohms resistance, was wound on and soldered to copper leads threaded in the mica. Each thermometer was placed in a box, blackened on the inside, and provided with a hinged cover. The thermometers were connected differentially to a Callendar electric recorder which was kindly lent me by Dr. Porter, Director of the Mining Department at McGill University.

Fig. 2 shows the thermometers in their respective boxes.

The boxes were placed side by side on the roof of the porch over the entrance to the Physics Building, and wires were taken to the laboratory across the front of the building and in at the window, where they were attached to the recorder. The recorder itself was placed

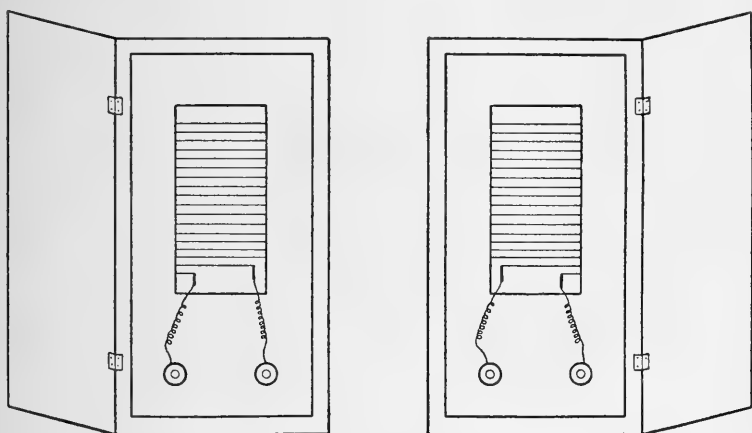


FIG. 2. RADIATION THERMOMETERS.

on a firm shelf, and was very conveniently located for examining the character of the records produced. When both of the covers of the boxes containing the thermometers, which we shall designate P and C, were closed down the thermometers indicated equal temperatures and were subject only to atmospheric disturbances. If either P or C were opened to the sky at night, the exposed thermometer at once became cooled by its own radiation below the closed thermometer situated alongside of it.

To obtain the screening of any material it was merely necessary to place it over the exposed thermometer, when the trace on the recorder indicated the effect. A box with a glass bottom was made in which water or a saturated solution of salt, when the air temperature was below the freezing point, could be placed.

Glass covers were made for the boxes which could be slipped in place under the hinged wooden covers.

Before constructing these special thermometers some experiments were tried with the differential thermometers which are in use at the McGill College Observatory, to obtain the temperature at the top of Mount Royal. These have already been described by Professor C. H. McLeod and myself.¹ The mountain thermometer was brought down to the observatory grounds and connected alongside of the low level thermometer cage. Equality, or zero traces were carefully made

Nocturnal Radiation
16/17 Feby '06.

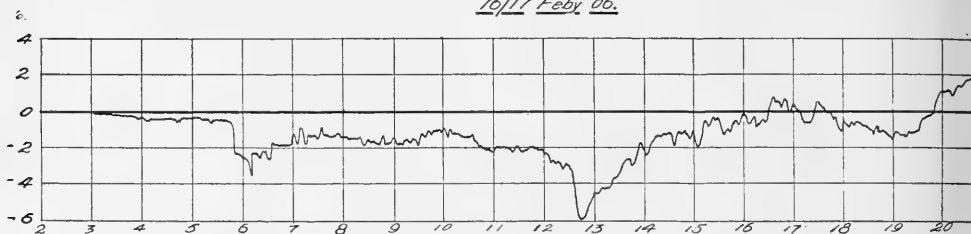


FIG. 3. RADIATION TRACE, MINIMUM AIR TEMPERATURE 0° FAHR. SHOWING EFFECT OF CLOUDS.

with the thermometers screened, and as nearly as possible at equal temperatures. One of the thermometers was then removed from the screen, and placed just over the cage, and exposed to the sky. The recorder at once showed that the thermometer was cooled, and the trace was continued on several occasions all night. It was a matter of considerable interest to observe the magnitude of the cooling, and to note the effect of a cloudy, or partially cloudy sky.

Nocturnal Radiation
17/18 Feby '06.

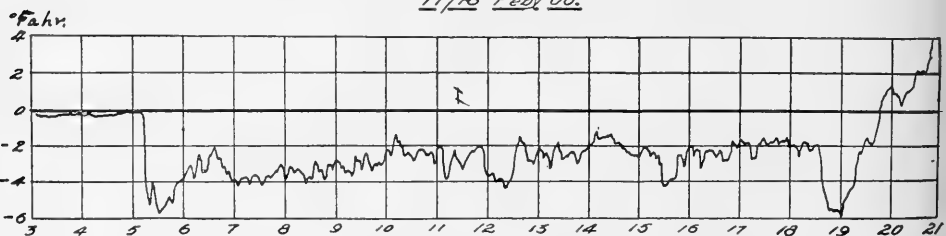


FIG. 4. RADIATION TRACE, MINIMUM AIR TEMPERATURE 3° FAHR. SHOWING CLOUD EFFECTS.

Fig. 3 shows one of these traces on a partly cloudy night. The maximum cooling was 6° F. at 12.45 a.m.

Fig. 4 is another trace showing similar effects. The thermometer was taken out of the cage and exposed at about 5.15, where the depar-

¹Trans. Roy. Soc. Can., 10, 71 (1904).

ture of the trace from the line of equal temperatures is shown. The return of the trace to the zero line and over to the warm side shows when the sun's rays came on to the instrument.

Before commencing the traces on the flat thermometers at the Physics Building, a number of zero traces were obtained which shows the small inequalities of air currents on the flat thermometers. Fig. 5 illustrates this very well. Figs. 6 and 7 show characteristic traces with glass covers over the boxes. The wooden cover was open over

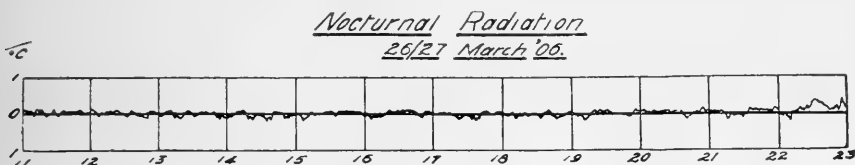


FIG. 5. ZERO TRACE.

thermometer P, and the trace travelled to the left. The maximum cooling effect was 2° Cent. Figs. 8 and 9 show direct radiation traces with the glass plates removed, the maximum cooling is seen to be slightly less than 4° Cent., 7.2° Fahr. The next three Figs., 10, 11 and 12, are similar traces, illustrating the different conditions of clearness of the sky. In every case the time of opening the wooden cover is clearly shown and was generally between 5 and 6 o'clock in the afternoon, when the sun was shadowed by the building. Usually the cover was closed again in the early morning to avoid the effect of the sun's rays. In Fig. 11 the sun had affected the readings before the cover was closed.

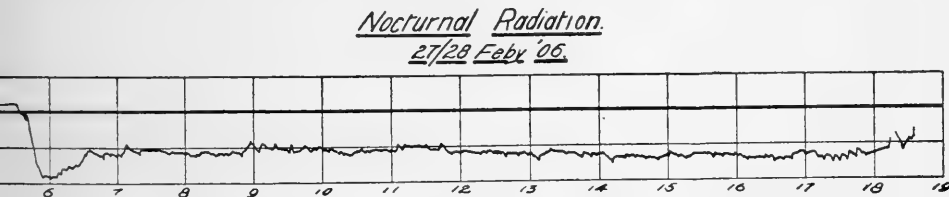
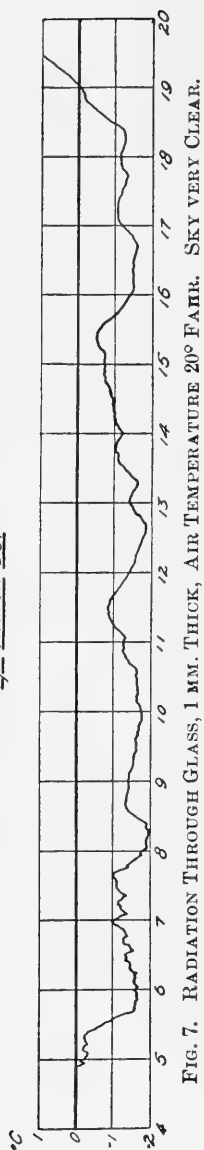
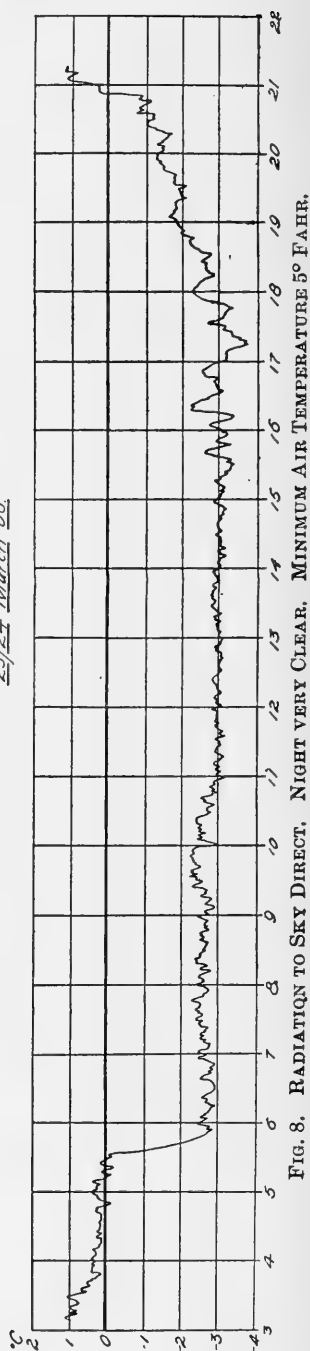
FIG. 6. RADIATION THROUGH GLASS PLATE, 1 MM. THICK, AIR TEMPERATURE 0° FAHR. SKY VERY CLEAR.

Fig. 13 illustrates the screening effect of glass and a saturated solution of salt. The glass covers were placed over the thermometers and the wooden cover of P opened at 7.45 p.m. The departure of the trace from the zero line previous to this was caused by some adjustments at the recorder, and does not indicate a displacement of the zero. At the time indicated on the diagram by the line B, a wooden box, provided with a glass bottom of similar thickness to the glass

Nocturnal Radiation.
5/6 March '06.



Nocturnal Radiation.
23/24 March '06.



Nocturnal Radiation.
25/26 March '06.

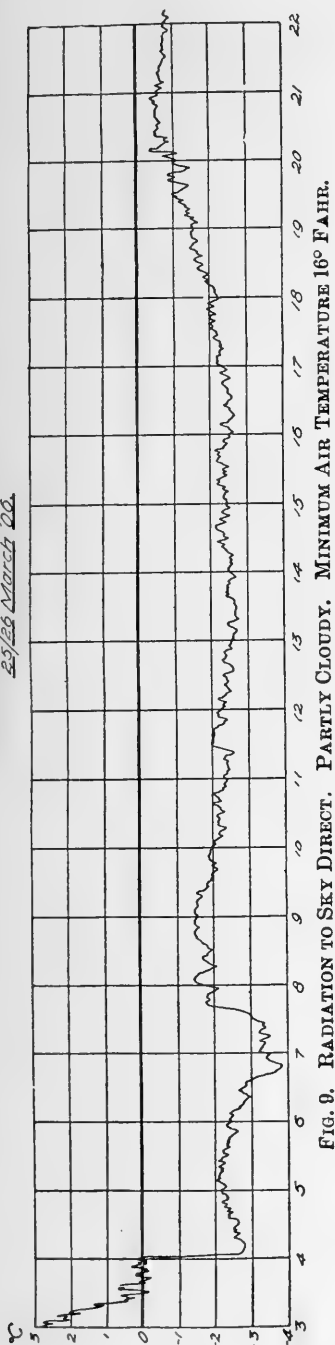


FIG. 9. RADIATION TO SKY DIRECT. PARTLY CLOUDY. MINIMUM AIR TEMPERATURE 16° FAHR.

Nocturnal Radiation.
17/18 April '06.

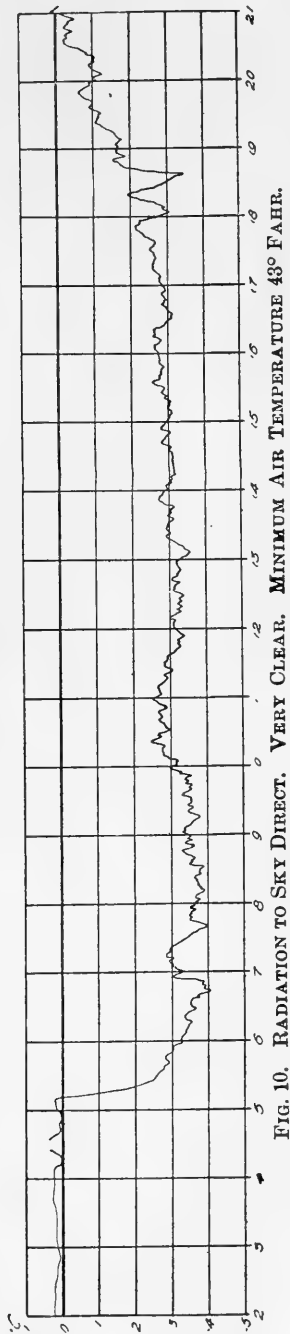


FIG. 10. RADIATION TO SKY DIRECT. VERY CLEAR. MINIMUM AIR TEMPERATURE 43° FAHR.

Nocturnal Radiation
18/12 April '06.

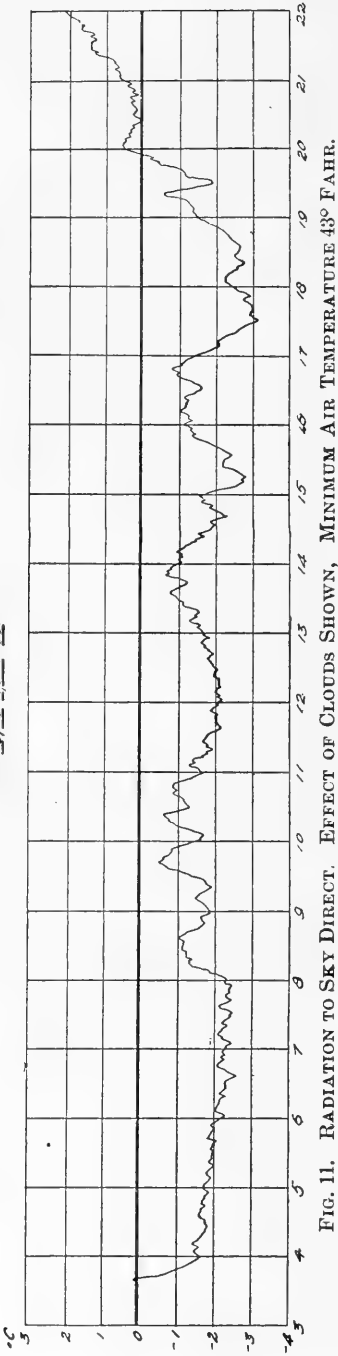


FIG. 11. RADIATION TO SKY DIRECT. EFFECT OF CLOUDS SHOWN, MINIMUM AIR TEMPERATURE 43° FAHR.

Nocturnal Radiation
20/21 April '06.

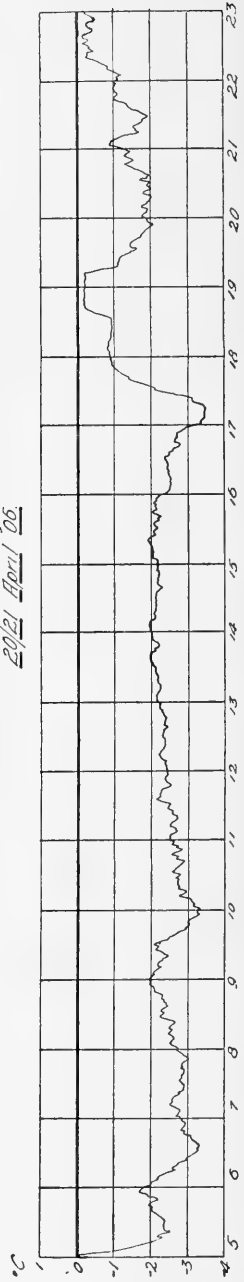


FIG. 12. RADIATION TO SKY DIRECT. NIGHT CLEAR AT FIRST; OVERCAST TOWARDS MORNING. AIR TEMPERATURE 45° FAHR.

cover, was placed over the thermometer P, and at the same time the glass cover was slipped out. At the line *c*, the salt solution was poured into the trough and covered the glass bottom to a depth of about 1 cm. The solution had been prepared in the afternoon and allowed to stand in a flask outside several hours in order that its temperature should be equal to that of the thermometer. At *d* the glass cover was put over the trough, so that at this point the radiation was penetrating two sheets of glass and about one centimetre of salt solution. At *e* the trough was removed and the glass cover slipped back into place leaving the conditions the same as at first. It was impossible, of course, to obtain a trace through the water alone without first passing it through some transparent rigid substance. Hence, this test of penetration is only on such rays as succeed in passing unabsorbed through glass. We can say from this test that water would not absorb more than this, but at the same time it might absorb less. The effect of the radiation through the water was enough to cool the thermometer nearly a degree

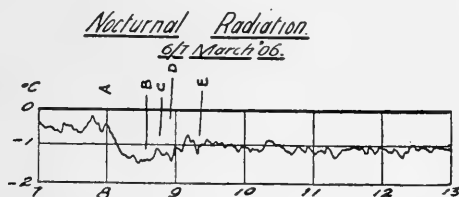
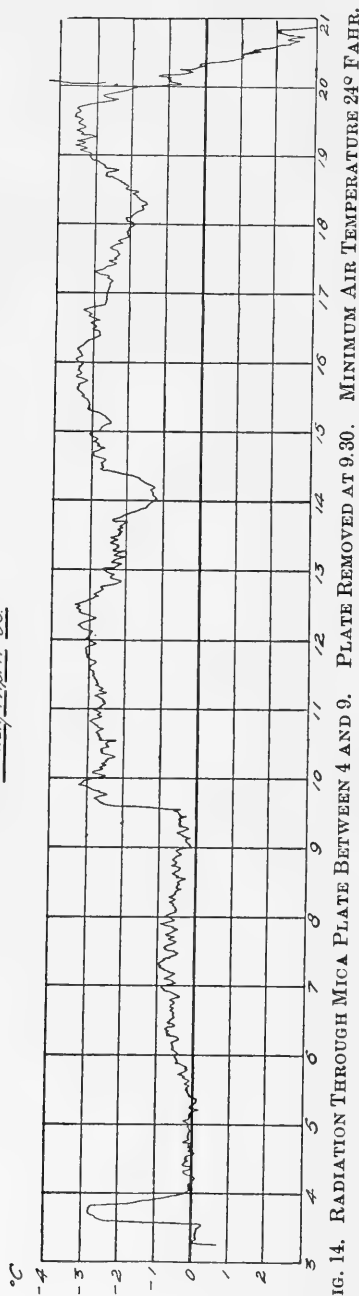


FIG. 13. RADIATION THROUGH SALT SOLUTION. MINIMUM AIR TEMPERATURE 14° FAHR.

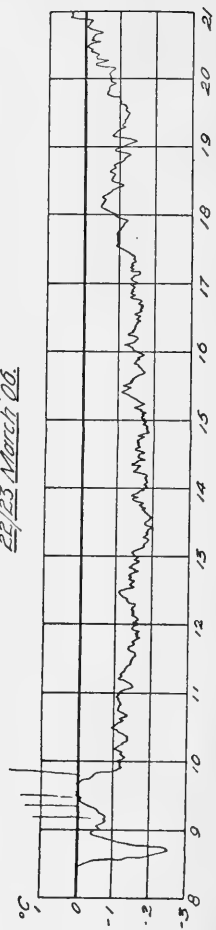
and a half. Unfortunately, I did not obtain the maximum cooling with the thermometer exposed directly to the sky, to give a comparative test for the maximum radiation at that time. The general direction of the trace is to show the radiation slightly falling off after 8.30 o'clock quite independent of the presence of the various screens.

I endeavoured to obtain some clear substance which would cut off less of the radiation than glass. Mica is known to be fairly transparent to the shorter heat rays, but from the character of the trace shown in Fig. 14 it is evidently fairly opaque to the earth's radiation. In Fig. 14, at 3.30 p.m., the cover of C was opened and the maximum radiation at that time determined with no screen over the thermometer. The trace is, of course, in this case over to the right. As soon as the trace was observed to be steady, a thin muscovite mica plate was placed over the thermometer. The screening effect was sufficient to bring the trace back to zero almost at once, where it continued until about 5.30, when a small deviation to the

Nocturnal Radiation
31 Mar/11 April '06.



Nocturnal Radiation
22/23 March '06.



right took place and lasted until 9.30, when the plate was removed entirely. The trace for the remainder of the night was for the direct radiation to the sky. I can only account for the radiation through the mica plate after 5.30 as due to a clearer sky or to a diminution of absorption of diffused sunlight as the evening approached. The mica plate was of a light yellow colour.

In Fig. 15 is shown the radiation through two inches of a clear ice block, which was cut from a large block of clear river ice. At 8.30 the wooden cover of thermometer P was opened and the maximum cooling obtained. Between 9 and 10 some ice blocks were tried of different thicknesses and clearness, with varying results. At 9.45 the two inch block was put in place and left over the thermometer for the

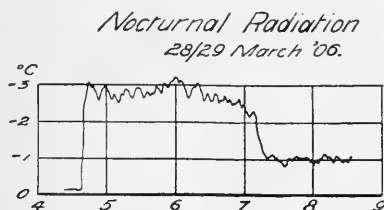


FIG. 16. RADIATION THROUGH 4 INCHES CLEAR ICE, COMPARED WITH RADIATION DIRECT. AIR TEMPERATURE 28° FAHR.

remainder of the night. It will be seen that the radiation reaches very nearly the maximum attained for the early part of the night.

In Fig. 16 is shown the effect of placing a block of clear ice four inches thick over the thermometer C, in this case at 7.15 o'clock. The trace from 4.35 to this time being for direct radiation. The ice block cuts the radiation down to about one-half of its previous value, since it was diminishing gradually from 6 to 7 o'clock.

Owing to the stress of other duties the traces had to be discontinued, but it is hoped that further work may be carried out next winter, both on the transparency of various substances for the earth's radiation during some extremely cold, clear weather, and in relation to the cloudiness of the sky. It seems likely that the traces might prove of service in meteorological work in the latter connection.

IX.—*Further Notes on the Difference in Temperature between McGill College Grounds and Mount Royal, Montreal.*

By PROF. C. H. McLEOD and DR. H. T. BARNES.

PART I.—PRESENTED MAY, 1905.

Since the presentation of our preliminary report to the Royal Society of Canada last year on the differential temperature records between the summit of Mount Royal and the McGill College Observatory* another set of records has been obtained during the winter months, which help to confirm our conclusions in regard to the value of these records as a means of foretelling temperature conditions. Unfortunately we cannot at the present time make our second communication as complete as we should like, owing to a serious fault which developed in our long distance cable shortly after the end of May, 1904. This resulted from the giving out of the insulation in the cable as the warm weather set in, the degree of insulation being so impaired as to make temperature records impossible.

After a long search involving considerable delay, the fault was located in a cut which had been made about a year previously by some malicious person. The repairs to the cable at this point had not been sufficiently carefully made by those in charge of the work, and water had percolated through a portion of the junction of the lead sleeve placed over the splice. During the cold weather any water which had entered produced no appreciable error, but with the advent of the warm weather, and the spring rains matters grew steadily worse.

Owing to the stress of other duties which prevented adequate time being devoted to the work it was late in the autumn of 1904 before the cable was sufficiently repaired to make further readings possible. The repairs consisted in opening the cable at the splice, drying it out and adding a new lead sleeve.

Tests of insulation then followed which showed that the separate wires were in fair condition but not perfect, amounting to two or three megohms for the worst cases. As the cold weather was approaching, when any fault of insulation would be reduced to a minimum, it was decided to go on with the work and defer until spring any further repairs to the line.

The determination of the absolute temperature of the mountain top compared with that of the observatory depends on so many factors that

* Elevations above sea level respectively 754 and 180 ft.

it was thought desirable to devote a considerable amount of time to a determination of the zero of the instrument under varying conditions of weather. For this purpose it was necessary to operate the recorder without the thermometer bulbs in their respective places. The long leads running to the top of the mountain, a distance of over 4100 feet were therefore connected together as well as the compensating leads at the top of the tower. At the observatory the thermometer bulbs were joined in series with these wires, where they were connected to the recorder, and were placed side by side in a vessel of water in order to keep them at equal temperatures. It was not found necessary to immerse the thermometers in ice to obtain the zero since the zero was merely the point of equal temperature at the bulbs. On account of the care taken to adjust the two thermometers to equality at the outset no appreciable shift in zero took place when the point of equal temperature was shifted along the temperature scale.

A test of this kind ranging over a long period is of the greatest importance in determining how adequate the compensating leads are in correcting for changes in temperature in the main leads. We had previously noticed when determining the zero in this way that small variations took place, resulting in a slightly zigzag line in place of the perfectly straight line, which is obtained when the recorder is connected to ratio coils of equal resistance. In the main it is possible to distinguish these small irregularities from the waves produced in the trace by small changes in temperature.

In the present zero tests we noticed decided fluctuations which appeared both with the thermometer bulbs connected, and when we removed them entirely from the circuit. These irregularities were as before of the order of one degree on either side of a central line which we took as the zero. Sometimes the pen would remain to the right of the line for hours tracing its characteristic line, and at other times we obtained the trace about the same amount to the left of the zero. In many cases we observed that the fluctuations were more rapid and of greater extent, and the pen moved back and forth in half hourly, or hourly periods.

In general we found that during the night we obtained the steadiest zero traces, and in particular when there was no wind. During a day with bright sunshine and high wind the trace was most unsteady. The approach of sunrise was in nearly every case accompanied by a slow displacement of the pen to the right of the zero. The variations noticed with a high wind would be accounted for by strains set up in the cable which would act in an irregular manner on the various wires, and the

slow travelling of the pen to the right from the warming of the upper surface of the cable by the sun.

It is impossible to determine which of the wires was located nearer to the top of the cable, but it is possible that either the main leads or the compensating leads run for a greater length near the upper part of the cable, which certainly detracts from the full value of the apparatus for temperature work.

The present cable has 11 wires, 6 of which are used for the anemograph connection and four for the temperature records. It is very much to be desired that a separate lead covered cable having only four strands be procured for the temperature work. The insulation should be rubber and braid and the wires should be twisted in such a way as to bring all equally to the upper and lower portions of the cable. Since owing to lack of funds such a cable is quite out of the question at the present time we decided to go on with the work, utilizing the existing cable. Moreover the differences which we had previously measured were so large that an uncertainty in the leads of even a degree Fah. was of secondary importance.

We were specially interested in the daily variations so we decided to pay less attention to the absolute readings for the present. The magnitude of the difference between the temperature on the mountain and observatory was of less importance than the relative differences from hour to hour. At the same time special watch had to be kept on a possible shift of zero.

After devoting about two months to obtaining a series of zero traces, the thermometers were put in place and on Jan. 9, 1905, the record of differences was resumed.

Since the resistance of the leads is about 40 ohms and that of the thermometers is only 10, special care had to be taken to watch the permanency of the former.

The Absolute Value of the Temperature Differences.

We found that the differences were not so large as we had recorded in our previous winter's work. No difference was observed at any time during the winter greater than 7 degrees Fah., while in our previous winter's work we had obtained differences amounting to 20 or 25 degrees as will be seen by referring to the charts published in our previous paper.

This can hardly be explained at the present time without a much greater study of the influence of climatic conditions, which it is hoped that further records may throw light upon. In general it may be said that the past winter was not so severe in the North, just above Montreal, to

judge by the records of the inhabitants of that district, as the winter of 1903-4. For instance, on one occasion when we recorded our greatest difference, colder on the mountain, the mercury was reported to have frozen in a thermometer as near as Ste. Rose, (20 miles), while during the winter just passed no such condition existed although the temperature at the observatory as shown by the monthly averages was about the same for the two winters.

Below we give the monthly average differences for February, March and April and for comparison we reproduce those for the corresponding months of the year previous:

MONTH.	1904-5	1903-4
February.....	-2.7	-8.1
March.....	-2.0	-5.9
April.....	-3.1	-6.8

Relative Temperature Differences.

In general we find that the position of the trace, whether rising or falling, is of the greatest importance in determining the character of the temperature conditions at the lower station for the following 10 or 12 hours. In nearly all cases of a sudden change of temperature we find that the high level instrument is affected several hours ahead. This is shown by the slow travelling of the pen across the sheet. A continued trace of positive differences (higher at the upper station) means weather conditions growing steadily milder at the low level. The following conditions have been observed to hold fairly accurately.

1. Steady positive difference shows weather conditions growing milder.
2. Increasing positive difference, or decreasing negative, indicates a change to milder weather.
3. Decreasing positive difference means steady temperature conditions possibly growing colder.
4. Increasing negative difference indicates temperature conditions growing colder at the lower level.
5. Steady negative difference indicates steady and continued temperature conditions at the low level.

All these represent changes at the low level following from 5 to 24 hours after the difference is observed to change. A few examples taken from our last year's records at random will serve as an illustration: On February 9th, a warm wave was indicated 9 hours before it reached the ob-

servatory. On February 21st, a cold wave was indicated 5 hours, in advance as shown by an increasing negative difference. On February 23rd a warm wave was observed to be approaching 12 hours before any change occurred at the lower station. On February 28th, a rapidly advancing warm wave swept across the high level thermometer 5 hours ahead of any change on the observatory thermometer.

The extent and duration of these differences would appear to indicate that estimates can be made for much longer periods ahead.

On two occasions when a heavy fall of snow occurred the precipitation and consequent heat development in the upper atmosphere was noticed on the upper thermometer causing a decided trace far over to the positive side of the zero.

It is evident that much further study must be made in which direction and velocity of the wind must be considered together with other climatic conditions.

Enough has been learned however, to make it of interest to carry on the work in the hope that useful material may be gathered which will aid local meteorological temperature forecasting.

PART II:—(presented May, 1906.)

Since the preparation of the previous note which was too late for publication in the Transactions of last year, we have obtained another set of records during the winter just past (1905-06).

We anticipated further trouble in our long distance cable with the advent of the warm weather during the spring of 1905. None developed, however, until the middle of June, when the insulation became insufficient for maintaining accurate records. On account of the absence during the summer of one of the authors, who has devoted special attention to the cable testing, no attempt was made to rectify the fault until the autumn, when the repairs having been completed, and tests made, the insulation was again found almost perfect, and the apparatus started.

Zero traces were obtained with both thermometers in the circuit at the observatory, in a similar manner to the tests described in Part I of this paper.

The records obtained show an average monthly difference of temperature in degrees Fahrenheit at the two stations as follows:—

December, 1905.....	—3.0	(Lower Station warmer)
January, 1906.....	—2.2	“
February, “	—1.6	“
March “	—2.5	“
April “	—3.7	“

Traces for the latter half of December, showing the differential records and the temperature at both stations, are presented in further illustration of the applicability of the former to weather prognostication. The temperature traces have not been corrected for index error, but the two curves show the proper difference between the upper and lower stations.

At noon on December 17th the temperature on the mountain became warmer than at the lower station, and so continued for ten hours, the temperature at the lower point falling slightly after 7 a.m. on the 18th, when the change to warmer weather began and extended through more than 20 degrees.

Before 10 o'clock a.m. on the 18th, while the temperature at the lower station was still increasing the differential record rapidly returned to zero, and then showed a negative difference which continued to increase at first rapidly and afterwards slowly for about 16 hours. The change to lower temperature at the Observatory took place at about 1.30 a.m. on the 19th, and continued through 15 degrees. The interval here noted between the change to a minus difference and the commencement of cold weather at the lower station amounted to 16 hours. A difference of upwards of five degrees was maintained between the stations for about twelve hours, indicating steady cold at the lower station, after which the difference decreased slightly until midnight of the 19th. Shortly afterwards the approach of a warm wave was noted by a return to zero and the lower station showed the expected change some ten hours later (10 a.m. of the 20th). In this case the differential record only just reached the zero, and after four hours fell away from it. As was to be expected, the temperature change at the lower station was of correspondingly small dimensions.

Following this the record remained at or slightly below the normal difference for the month, and no considerable change occurred in the air temperature until the 22nd at 8 a.m. when the approaching change was heralded by the differential thermometer at 3 a.m., or only 5 hours in advance. Again the plus indications were of slight duration, and the warm period similarly brief. The following two days gave a period of steady temperature with a gradual approach to colder weather on the evening of the 24th, and no considerable fluctuation in difference from minus 5 degrees until midnight on the 24th, when for a few hours the record showed a plus sign reaching +3 degrees, and the air temperature rose to 30 degrees at noon the following day, the 25th. Similar cases of advanced warning may be observed in the following days. The very extensive deviation to the plus side continuing from 3 p.m. on the

27th to 6 a.m. on the 29th was followed by the long period of warm weather covering the greater part of the 28th, the 29th, 30th and 31st, and although a normal minus deviation was recorded as early as 10 a.m. on the 29th, colder weather did not set in until midnight of the 30th. These results presented in tabulated form to show the interval of warning of an approaching change in temperature are as follows:—

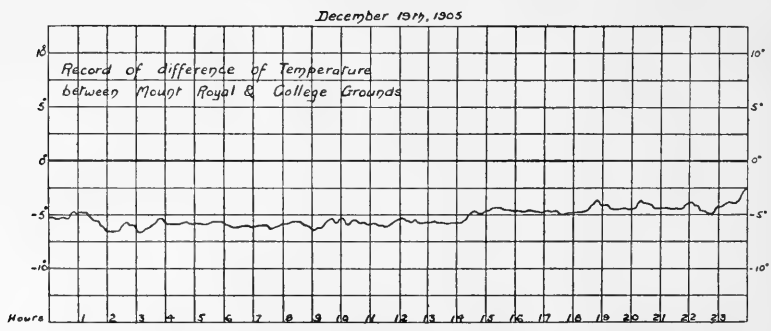
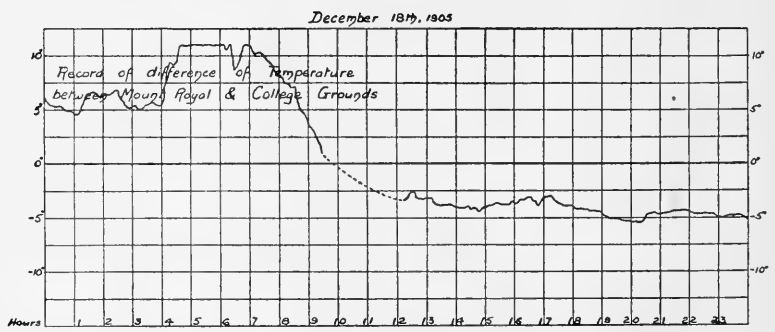
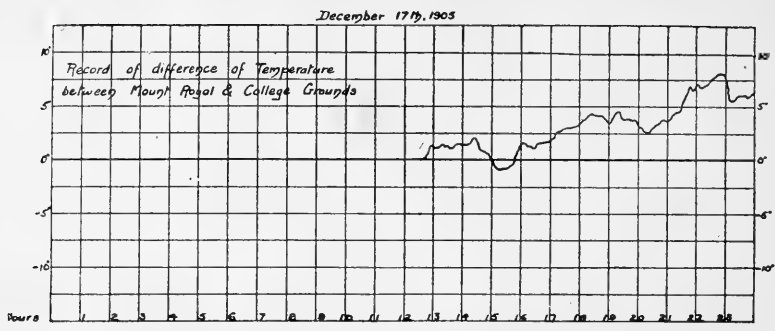
Time at which change was noted on Diff. Record.	Character of Indication.	Time at which expected change occurred at Lower Station.	Interval of Warning.
1905.		1905.	
December 17 12 noon.....	Warmer	December 18 7 a.m.....	19 hours
" 18 10 a.m.....	Colder	" 19 1.30 a.m.....	16 "
" 19 12 midnight..	Warmer	" 20 10 a.m.....	10 "
" 22 3 a.m.....	Warmer	" 22 8 a.m.....	5 "
" 24 12 midnight..	Warmer	" 25 12 noon.....	12 "

In the curves following will be seen the differential traces as obtained on the records from the temperature recorder. The zero line, or line of equal temperature is indicated by a thicker mark. Over the zero line the differences are positive, indicating warmer on the mountain, while the reverse is the case below the line.

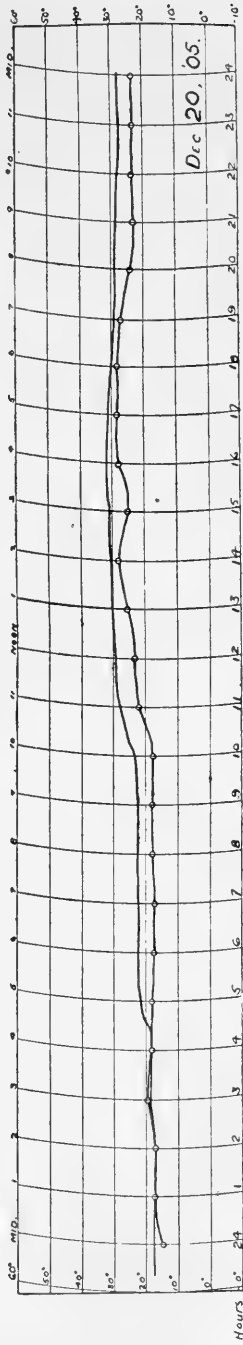
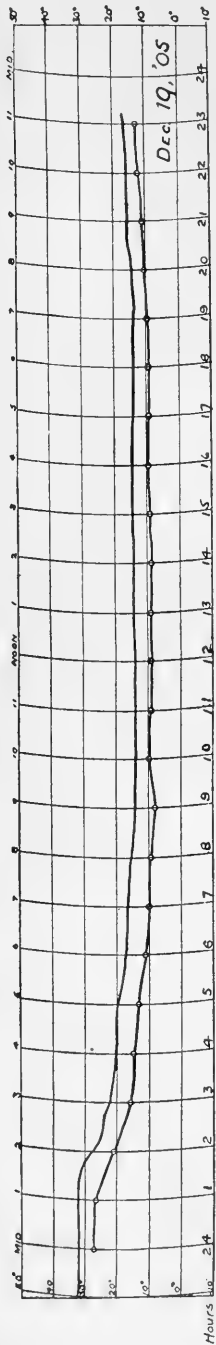
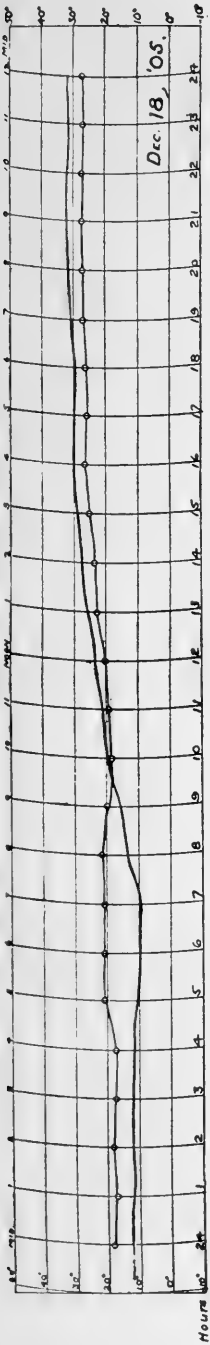
In the thermograph records following the differential traces, the mountain temperature is shown on the trace through the small circles, the other trace giving the temperature at the lower station.

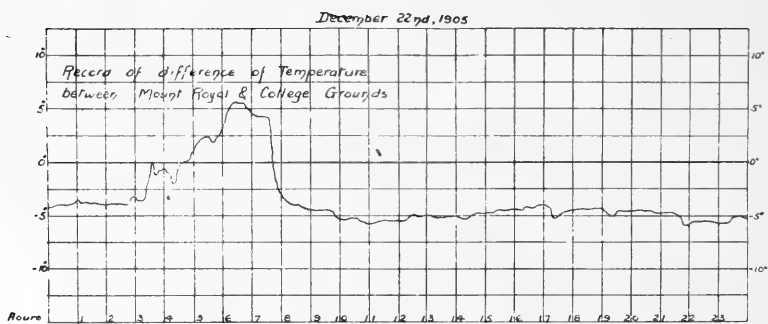
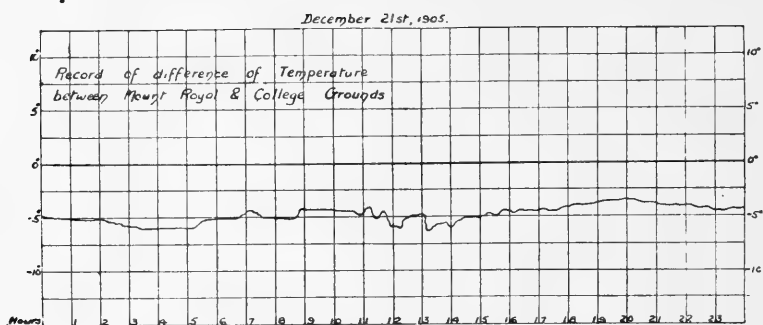
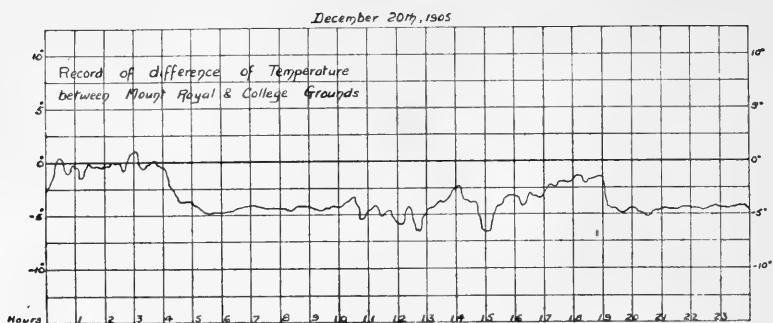
(Note added Oct 2, 1906.)

Tests of the insulation of the cable, made as the warm weather advanced in June, showed the lines to be almost perfect, and in consequence a series of excellent traces has been obtained during the summer months. These will be analysed and presented in a future paper.

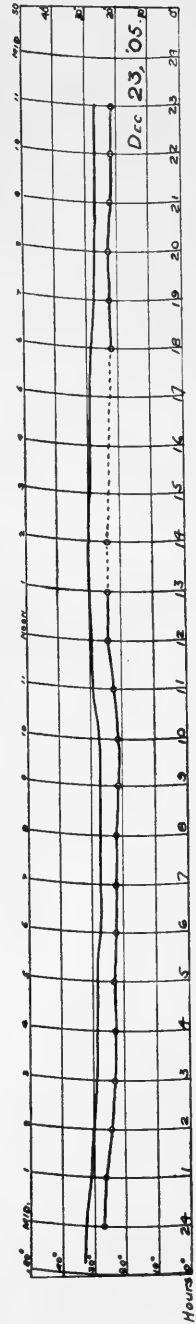
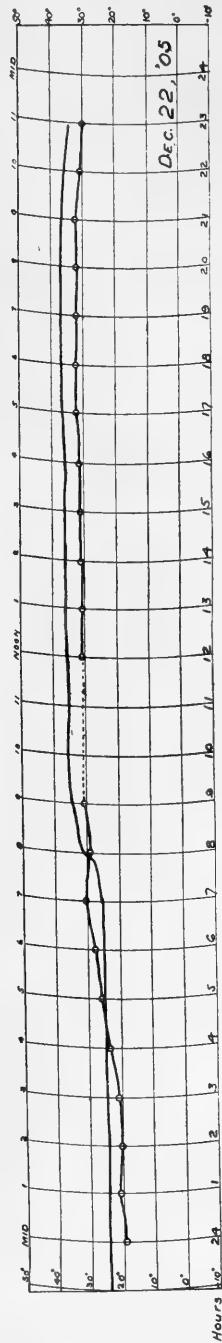
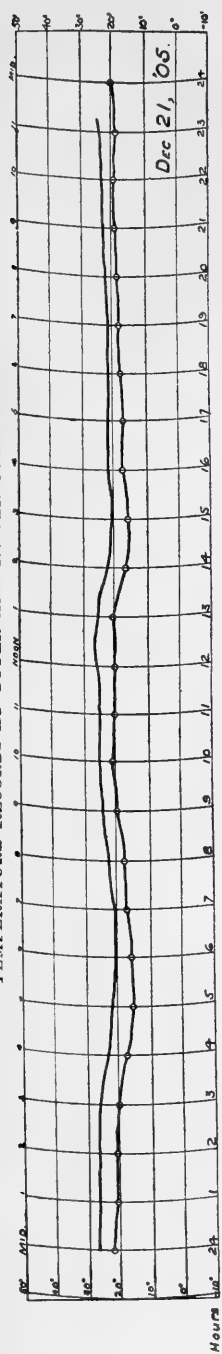


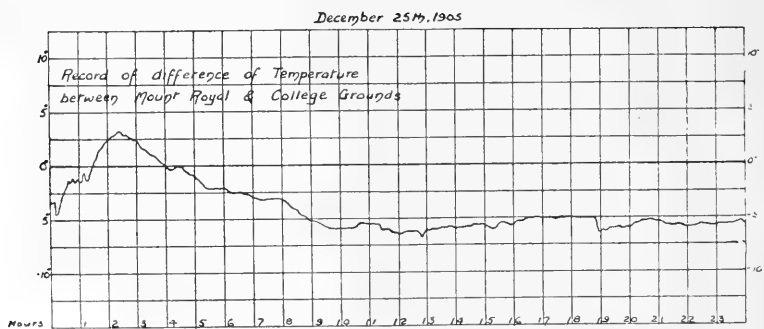
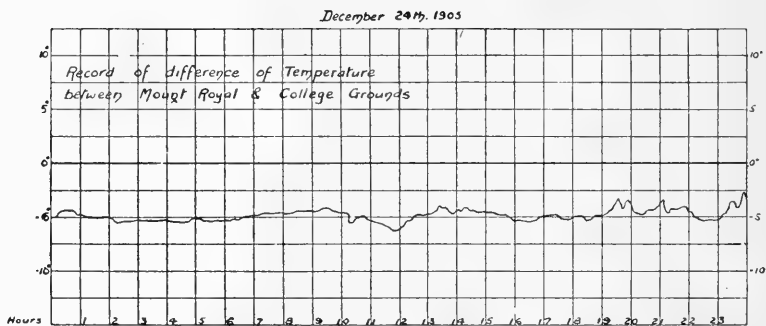
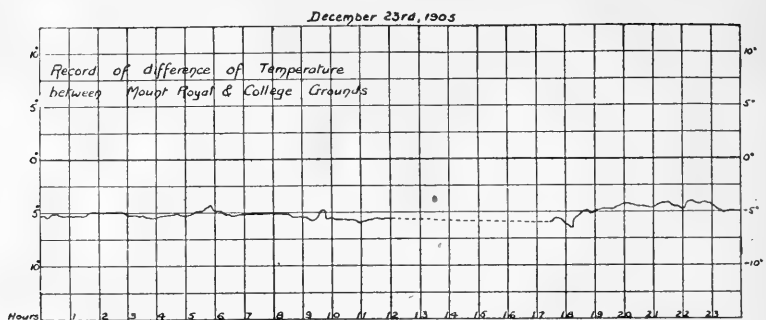
TEMPERATURE RECORDS AT UPPER AND LOWER STATIONS.



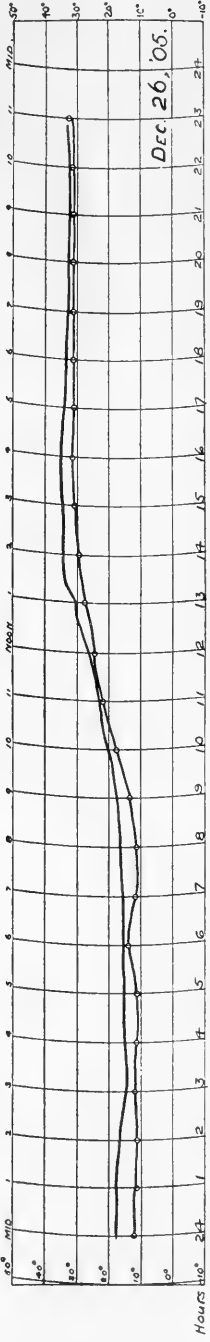
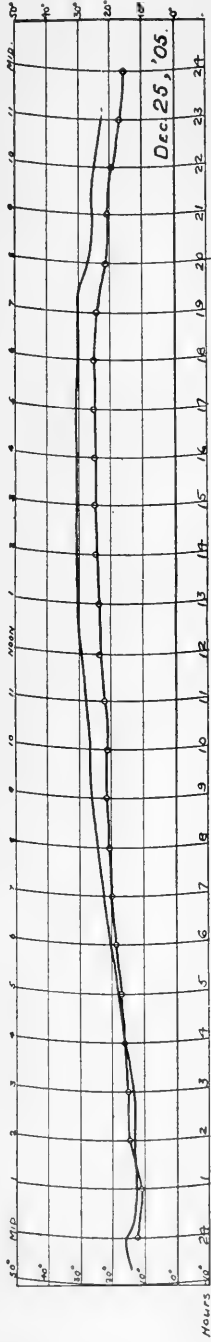
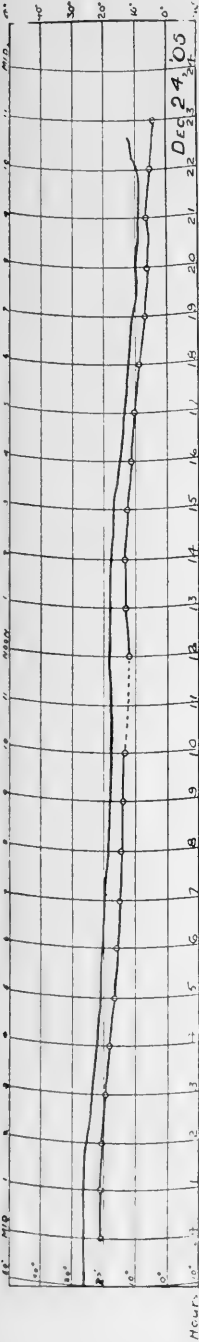


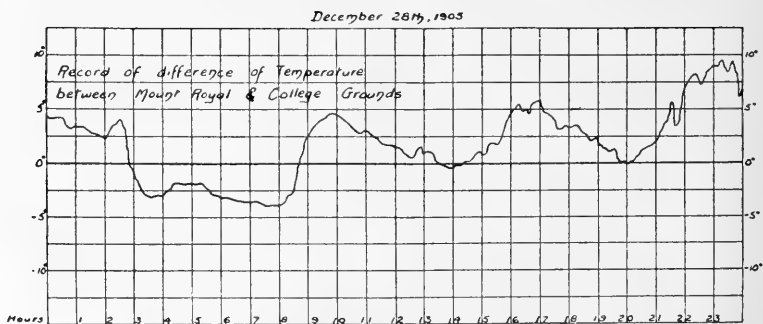
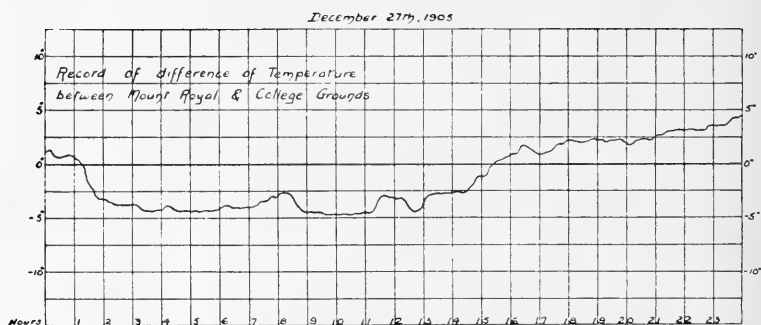
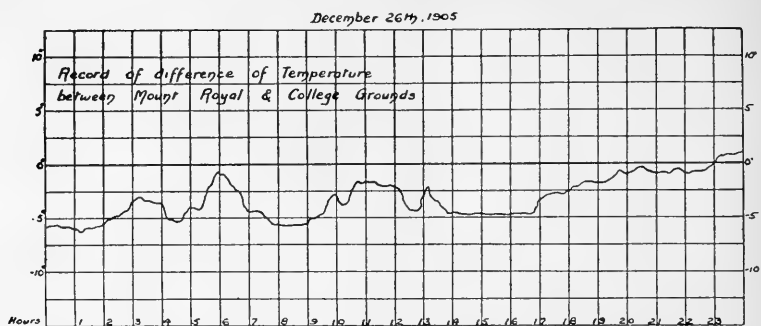
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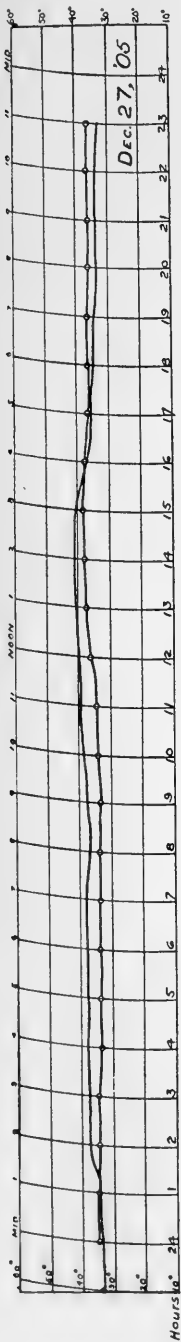




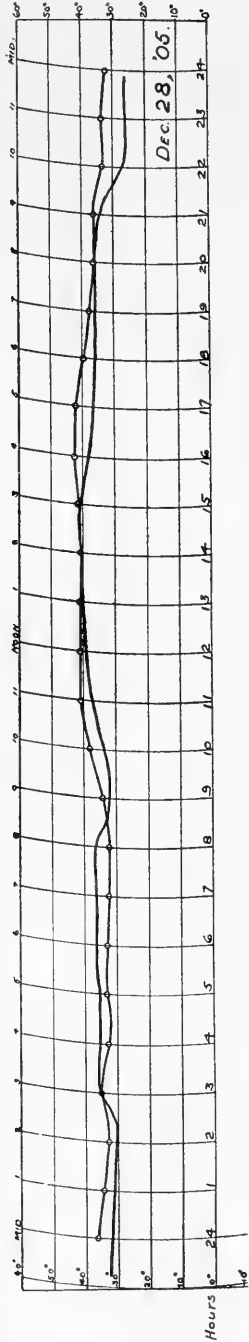
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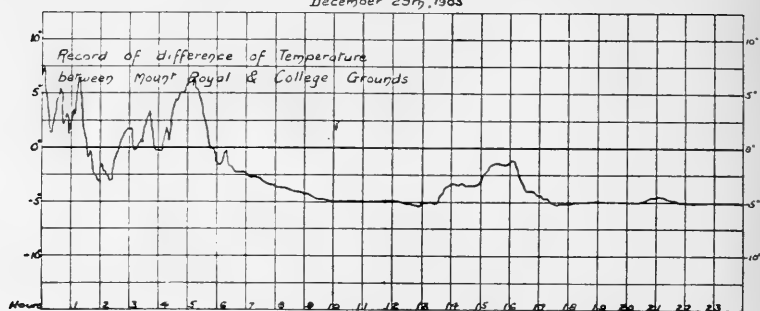




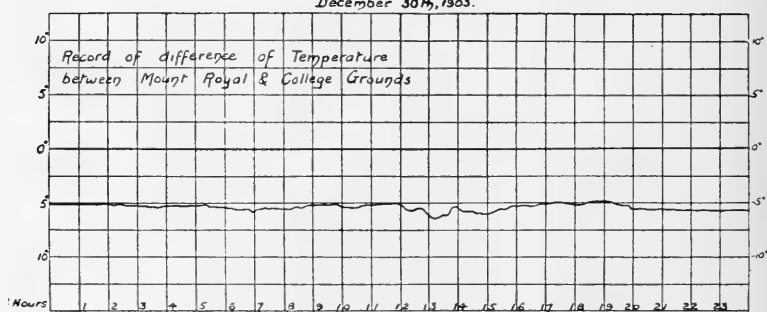
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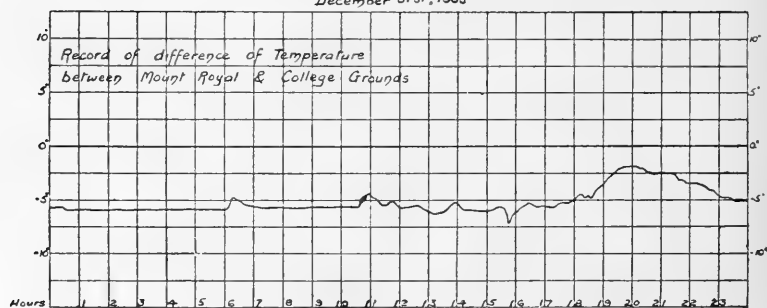
December 29th, 1905

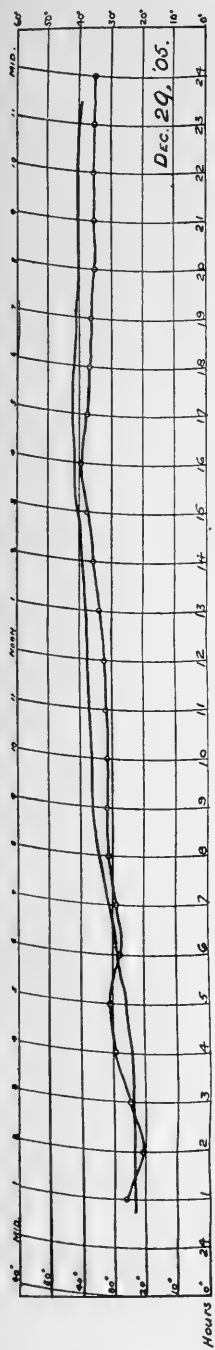


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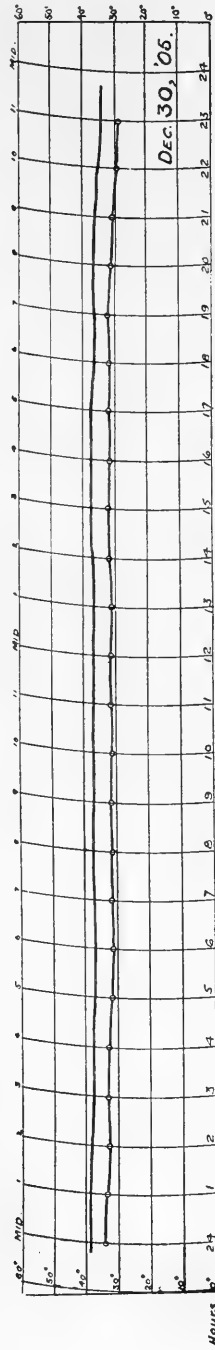


December 31st, 1905





TEMPERATURE RECORDS AT UPPER AND LOWER STATIONS.



X.—*Effect of an Electric Current on the Modulus of Elasticity.*

By R. W. BOYLE, M.Sc.,

Demonstrator of Physics, McGill University.

(Communicated by DR. H. T. BARNES).

Read May 23rd, 1906.

For a long time there has been an idea that the passage of electricity in a strained wire had some effect on its longitudinal elasticity, enough at least, to alter its modulus.

Wertheim, in 1844, considered that he had shown that the longitudinal elasticity of metals was temporarily diminished by the passage of an electric current, independently of the alteration which would result from the elevation of temperature produced by the current. (Wertheim, *Ann. de Chimie*, 1844, tom XII.)

Tomlinson, in his work on "Influence of Stress and Strain on the Action of Physical Forces" (*Phil. Trans.*, Vol. 174, 1883), says that in Wertheim's work on the coefficient of elasticity there must have been errors due to his method of proceeding when determining the elasticity by static extension. He (Wertheim) put on a weight, took a reading with the measuring microscope, and, after removing the weight, took a second reading; from the difference in these two readings he determined the value for the modulus.

Tomlinson says that if after considerable extension had taken place Wertheim had repeated his trials with each of the previous weights, he would have obtained appreciably different values, and the general result would have been to give him a greater mean value for the modulus.

Every experimenter on stress and strain by tension must notice this fact. It is very rarely that any material so tested immediately returns to *exactly* its original dimensions, even though the stress may be considerably below the elastic limit; but usually the difference is small. This, perhaps, can be accounted for by the want of uniformity of the material, the heat developed by the straining, and the *hysteresis* effect, *i.e.*, the lagging of the relation of stress to strain, an effect analogous to magnetic hysteresis though proportionately not so large.

The work of Wertheim probably was the cause of the suspicion that the passage of an electric current in a wire altered its modulus of elasticity.

Sylvanus Thompson in his "Electricity and Magnetism," 1902 edition, under the heading of "Physical Effects of an Electric Current"

refers to the question as follows:—"During the passage of a current through metallic wires their cohesion is temporarily lessened, and there also *appears* to be a decrease in their coefficient of elasticity. It was thought by Edlund that a definite elongation could be observed in strained wires when a current was passed through them; but it has not yet been satisfactorily shown that this elongation is independent of the elongation due to the heating of the wire owing to the resistance it opposes to the current."

Acting from the suggestion of this last clause the present work was undertaken. One would hardly expect that a tensile strain could produce the effect mentioned, and the results obtained in this work go to show that at least for the materials here tested no such effect is produced. No other conclusion can be taken from the observations obtained.

The present work was done on:

(1) *Pure metals*,—Copper, aluminium, steel, which are the metals most used in electrical work; and (2) *Alloys*,—German silver, man-ganin, constantin, rheotin, which are used for resistance purposes in electrical laboratories.

Arrangement of Apparatus and Method of Experiment.

A rigid suspension for the test wire was made in this manner: An iron plate, 6" x 1 and $\frac{3}{8}$ " thick was tightly screwed to a heavy oak beam. Through this plate protruded two studs with ends threaded. Another iron plate, of dimensions same as the first, fitted exactly over it, and the two plates were tightly secured to one another by means of bolts on the studs. By squeezing the wire between the plates the suspension is made very rigid.

The wire hanging from the plates was about ten feet long, and carried at the bottom a scale-pan for holding the weights which made up the load on the wire.

A heavy copper wire was soldered to the suspension plates, and a light flexible copper wire to the junction of the test wire and the scale-pan. These wires conducted the current to and away from the test wire.

A thread of brittle wax on the wire, drawn out to a point when soft, served as a very good pointer to indicate the extensions, which were measured by a cathetometer giving readings to one-thousandth of a millimetre. By keeping the cross-hairs of the cathetometer telescope focussed on the wax pointer very small extensions could be observed on the cathetometer scale.

The first work done was to take the stress-strain curve of a wire, of the same material and of the same dimensions, as the test wire.

This determined the elastic limit and showed the safe load to apply without permanently straining the material.

The test wire was now hung from the suspension plates, and was kept stretched, below the elastic limit, for two or three days in order to make it free from kinks. After this the weights were removed, and the wire was given at least an equal period of rest before taking observations.

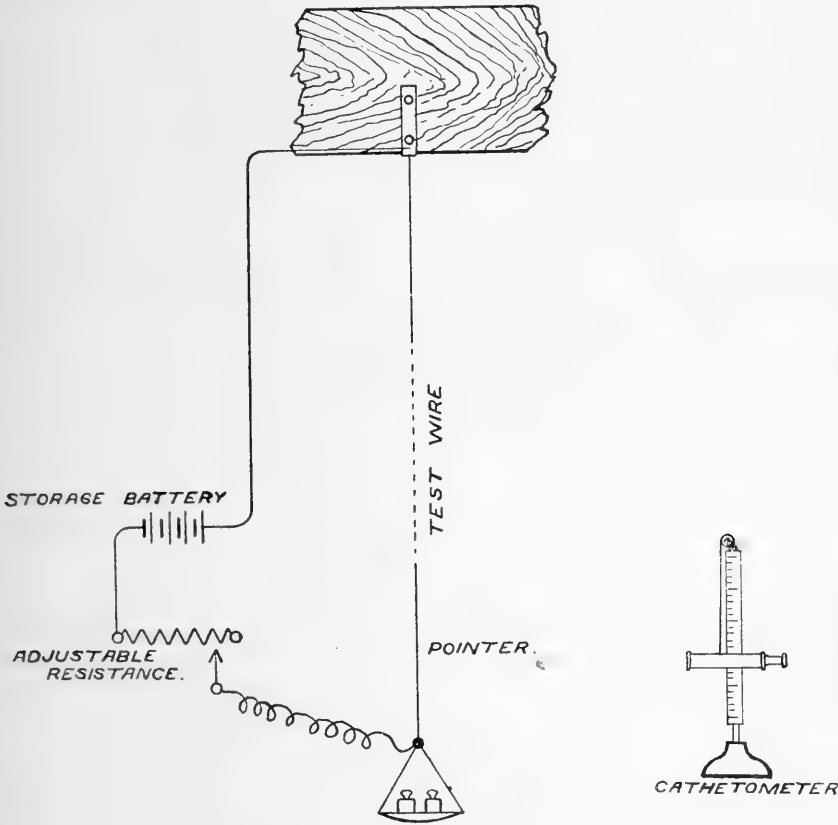


FIG. 1.

The source of current through the wire was a battery of storage cells giving a very steady current, which could be adjusted to any value by a rheostat in the circuit. The accompanying diagram (Fig. I.) shows the whole arrangement. The stress-strain curve, up to the maximum safe load, determined from the preliminary test, was taken at first for no current in the wire. After turning on the cur-

rent, the wire was allowed to undergo the full extension caused by the heat generated by the current, and these extensions were measured and plotted; then the stress-strain curve was taken as in the case of no current in the wire. The current was varied up to such a value that the heat generated by it was sufficient to melt the wax pointer on the wire. This would be at a temperature not higher than 50° C., so that no annealing effect on the wire could have been possible. The maximum current experimented with represented a high current density. Any heat generated by the stretching of the material could not have been sufficient to cause appreciable extension. The temperature of the room at the place of test was very constant, never varying more than a degree during the test, and usually varying by only a few tenths of a degree.

By Hooke's law, if P is the total load on the wire of length L and cross-sectional area A , and l is the extension caused by P ; then, up to the elastic limit,

$$P = E A \frac{l}{L},$$

where E is the modulus of elasticity.

$$\text{Hence } \frac{P}{A} = E \cdot \frac{l}{L}$$

$$\text{or } p = E \cdot e,$$

p being the stress and e the strain. Hence E is proportional to the slope of the stress-strain curve, and any change in the slope signifies a change in E .

In all cases the curves obtained show that, taking account of the extensions caused by the heat of the current, the stress-strain lines are parallel to the stress-strain line when there is no current in the wire; and when the extension caused by heat is deducted from the total extension the stress-strain lines are identical.

Constantin.

This is one of the later resistance alloys. Its composition varies, sometimes being given as 60 Cu, 40 Ni, and sometimes 58 Cu, 41 Ni, 1 Zn. It is a tough, fairly soft, and not very stiff material with elastic limit high, but not very strong beyond that.

The preliminary test for the stress-strain curve (Fig. 2), shows the elastic limit of the specimen to be at a load of 4,650 gms., cor-

responding to a stress of 24,420 lbs. per sq. inch, or 1,718 kgm. per sq. cm., and a strain of .001245. This gives a modulus of elasticity of 22.37×10^6 inch-lb. units, or 1.575×10^6 cm.—kgm. units.

The specimen tested was 265.3 cm. long, and .0221" (= .0562 cm.) diameter. It can be seen that below the elastic limit this material

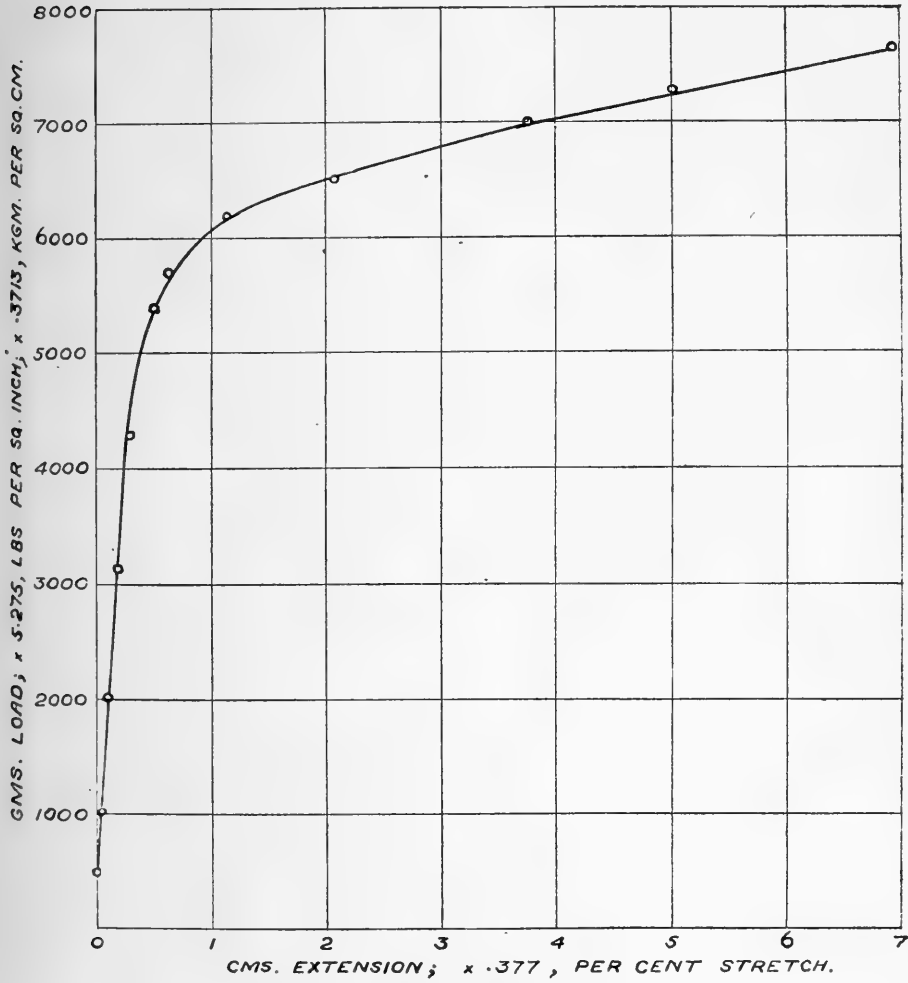


FIG. 2.

is very elastic and strong. Of course the same material with larger cross-section would not be as strong in proportion, as we know that pulling out and drawing through dies has a hardening and strengthening effect, and produces a hard and tough skin which is much stronger

than the softer material inside. The result is that the smaller we draw out a wire the stronger it becomes in proportion to larger wires of the same material.

With constantin, as soon as the load passes the elastic limit, the material shows a slow pulling out, so that no definite extension can be said to correspond to any applied weight. As the load increases this

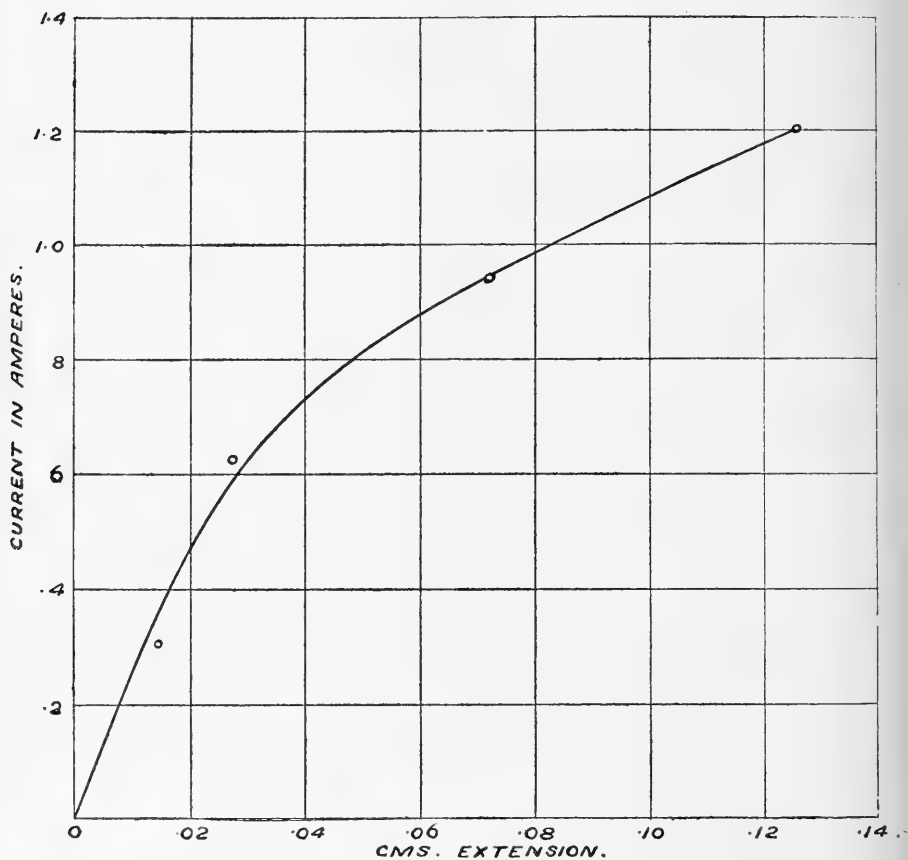


FIG. 3.

effect becomes more rapid, until it becomes quite easy to pull the wire out by just pressing downward on the scale pan with the hand.

The extensions given for the weights on data sheet A are the total extensions when the wire has pulled out as far as it will go, without waiting over long periods for the stretching to cease.

(The toughness and strength of this material below the elastic limit, with its property of a very low resistance-temperature coefficient,

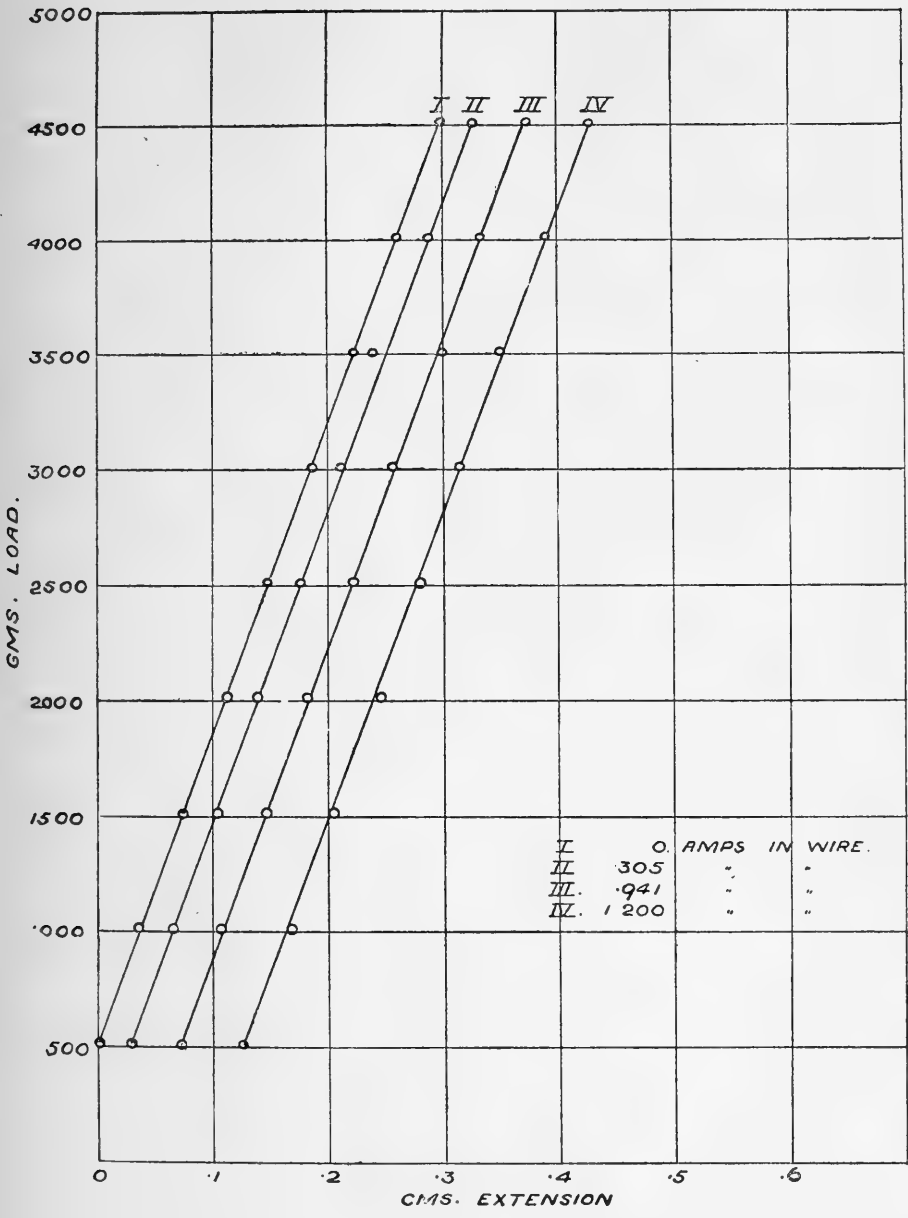


FIG. 4.

make it very suitable for a resistance wire; but its undesirable feature of producing large thermo-electric effects makes it less desirable than some other alloys for use as a standard resistance.)

Stress-strain curves were taken for different values of current 'up to a load of 4,515 gms., which the preliminary test showed to be quite safe in not producing a permanent strain in the material. Data sheet B shows the results.

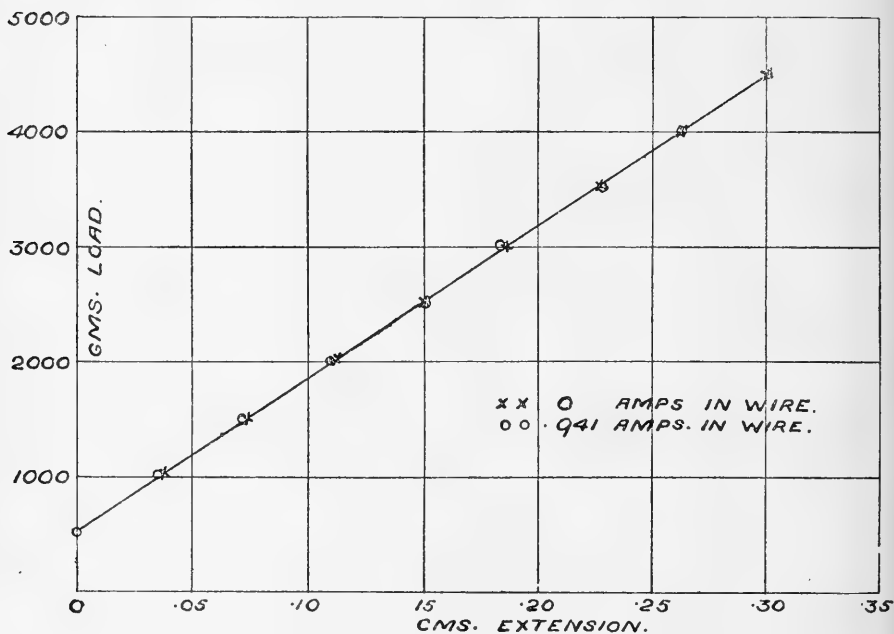


FIG. 5.

Fig. 3 shows the extensions caused by the heat of the current. Fig. 4 shows the stress-strain lines for different currents, taking account of extension caused by heat; it can be seen that they are all parallel to the no current line.

Fig. 5 is a sample of the agreement between the stress-strain line for no current in the wire, and the line for the case of a current in the wire, when the extension due to the heat of the current is deducted.

In this way it is proved that the stress-strain line is the same when a current is in the wire as when there is no current. Hence, there can be no change in the modulus.

DATA SHEET A.

Constantin.

Original Length,		265.3 cms.
Diameter,		.0221 inches.
Loads in Gms.		Cms. Extension.
515		0
1015		.0263
2015		.0977
3132		.1852
14298		.2947
5398		.5215
5693		.6278
6193		1.1511
6493		2.0832
6993		3.7572
7293		5.0109
7593		5.9362
7993		7.5618

¹ At loads greater than this, there was a slow pulling out of the material, so that no definite extension could be said to correspond to any given weight.

DATA SHEET B.

Constantin.

Load, Gms.	Cms. Extension for Current in Wire of				
	0 amperes =0 amps/□"	.305 amps. =795 amps/□"	.625 amps. =1629 amps/□"	.941 amps. =3454 amps/□"	1.2 0 amps. =3130 amps/□"
515	0	.0147	.0273	.0720	.1258
1015	.0359	.0548	.0648	.1062	.1681
1515	.0740	.0938	.1043	.1435	.2053
2015	.1121	.1290	.1395	.1810	.2457
2515	.1471	.1634	.1765	.2230	.2808
3015	.1870	.2031	.2109	.2555	.3131
3515	.2216	.2411	.2396	.2999	.3500
4015	.2590	.2780	.2871	.3342	.3813
4515	.2983	.3172	.3268	.3727	.4327
	.2983	.3025	.2995	.3007	.3068
					Total exten- sions.

Data and curves, corresponding to those shown for constantin, were also obtained for manganin, rheotin, German silver, copper, and aluminium; but as the result is the same in every case they are not shown here. In order to give an idea of the nature of the materials tested the following descriptions are given:

Manganin.

This is the familiar alloy so much used for resistance standards on account of its low temperature coefficient and other good physical qualities. It is usually considered to be the best and most reliable of alloys for standard purposes. Its composition, perhaps, is variable, but it is likely to be something about Cu. 84, Ni. 12, Zn. 3.5.

The test-specimen was .0235" (= .0597 cm.) diameter; its modulus was 21.60×10^6 ins.-lb. units, or 1.518×10^6 cm.-kgm. units.

After the elastic limit is passed the material exhibits the same property in slowly pulling out as constantin does.

Rheotin.

One of the latest resistance alloys. It is a material much harder and stiffer than constantin and manganin, and is very much stronger. It breaks under a load not much greater than the elastic limit load, and there is only a very little pulling out when the elastic limit is passed.

The specimen was of .0226" diameter, elastic limit corresponding to a stress of 104,500 lbs. per sq. inch (= 7,350 kgm. per sq. cm.), and a strain of .00607. The modulus of elasticity was 17.20×10^6 inch-lbs. units or 1.209×10^6 cm.-kgm. units.

German Silver.

The specimen, .023" diameter, was of the ordinary German silver wire that is so much used for resistance purposes; composition was approximately Cu. 60, Mn. 26, Ni. 14. The stress-strain curve showed it to be not as strong as rheotin, though much stronger than constantin and manganin. *

As in the case of rheotin there is not much pulling out just after the elastic limit is passed, but this effect increases as the load is increased. In most physical properties the material seems to come between rheotin and constantin.

The elastic limit corresponded to a stress of 46,050 lbs. per sq. inch (= 3,328 kgm. per sq. cm.), with a corresponding strain of

·00257. This gives the value of the modulus as 17.92×10^6 inch-lb. units, or 1.260×10^6 cm.-kgm. units.

Copper.

This was a specimen, .0319" diameter, of the soft, annealed, fairly pure copper wire made by the Montreal Wire and Cable Company for electrical work.

It does not stand much tensile stress, the elastic limit corresponding to a stress of 8,975 lbs. per sq. inch ($=695$ kgm. per sq. cm.), with a strain of .000579. This gives the modulus the value 15.49×10^6 cm.-kgm. units.

When the loading gets beyond the elastic limit there is the slow pulling out of the wire shown in the other materials, so that no definite extension can be said to apply to any weight.

Aluminium.

Specimen was of .0319" diameter. Elastic limit corresponded to a stress of 12,420 lbs. per sq. in., or 874 kgm. per sq. cm.

The calculation for the modulus gave a value 15.49×10^6 inch-lb. units, or 1.090×10^6 cm.-kgm. units.

There is not much pulling out below the load corresponding to the elastic limit, though, after that, it is quite appreciable. The material breaks when the load becomes a little greater than the elastic limit load.

Steel.

This specimen was one of the strongest of pianoforte steel diameter, .0191". The stress for the elastic limit was as high as 246,000 lbs. per sq. inch, or 17,320 kgm. per sq. cm. The value of the modulus was 28.96×10^6 inch-lb. units, or 2.037×10^6 cm.-kgm. units.

Conclusion.

M. C. Noyes, in her work on the influence of temperature and of an electric current on Young's modulus, finds that for steel, although temperature causes a decrease in the value of the modulus, yet, when a current passes through the wire, the modulus is the same as when there is no current.¹ In the following year she finds that an electric current in a copper wire has no effect on the modulus.²

From the data and curves obtained here, the only conclusion to take is that the passage of a current in a wire does not alter its

¹ Noyes—Physical Review, Vol. 2, page 277, 1895.

² Noyes—Physical Review, Vol. 3, page 432, 1896.

modulus of electricity; at least, this is true for the materials here tested.

This work only concerned currents, the actions of which were of short duration. Perhaps, after a current has been passing through a wire for a long period, of months or years for instance, there may be an effect on the modulus; but such changes are liable to occur, and do occur, if the material is left alone without any current in it. It would be difficult to distinguish and measure the effect by the current from the same effect by other courses.

For currents of short duration, the probability is that in all materials the same results would be obtained as were obtained here, viz., that the current has no effect whatever in altering the modulus of elasticity.

The values of the modulus found for the materials tested are given in the following table:—

Material.	E in inch-lb. units.	E in cm. kgm. units.
Constantin	22.37×10^6	1.575×10^6
Manganin	21.60×10^6	1.518×10^6
Rheotin	17.20×10^6	1.209×10^6
German Silver	17.92×10^6	1.260×10^6
Copper	15.49×10^6	1.090×10^6
Aluminium	15.49×10^6	1.090×10^6
Steel	28.96×10^6	2.037×10^6

I desire to thank Dr. Barnes for his advice and help in carrying out these experiments.

XI.—*The Effect of Tensile Stress on Electrical Resistance.*

By R. W. BOYLE, M.Sc., Demonstrator of Physics McGill University.

(Communicated by DR. H. T. BARNES, and read May 23rd, 1906.)

The object of this investigation was to find out if a tensile stress in a wire produced changes in its electrical resistance, beyond what we know to follow from its changes of dimensions, which can be calculated for.

Work of this nature has been done before, but not for resistance alloys such as constantin, manganin, and rheotin, which are now used for electrical work.

William Thompson (Lord Kelvin) in 1856 stated that "he had very nearly established, for the case of iron, at least, that the augmented resistance due to tension, either temporary or permanent, is very little more than can be accounted for by the change of form."

The whole problem is, of course, one of change of Specific Resistance.

It was conclusively established by Lord Kelvin and others that the specific resistance always increases with the decrease of density, so that if the density decreases we may expect an increase of specific resistance and hence a greater change of resistance than we can calculate for from change of length and diameter.

Tomlinson, working on this subject under "Influence of Stress and Strain on the action of Physical Forces" (Phil. Trans., Vol. 174, 1883), found that permanent extension by longitudinal traction produces a slight alteration of density. In his experiments this change was a decrease of density which never reached as much as .5 per cent although some of his wires were strained to breaking.

Previous to this Wertheim had obtained similar results (Ann. de Chemie, 1884, tom XVI); and Gray and Henderson working on this subject under Lord Kelvin in 1887, found a change in density amounting in the case of copper to fully .5 per cent.

The present work was on the resistance alloys, Constantin, Manganin, Rheotin, and on the pure metals, Copper, Aluminium. No work of this kind, so far as we know, has been done on the first three, but was done for the last two by Tomlinson and by Gray and Henderson.

In this work the method of measuring the resistance was by the fall of potential method, the potential drop being measured on a 100,000—ohm Thompson-Varley slide.

Arrangement and Description of Apparatus.

A rigid suspension for the test wire was made by squeezing it between two iron plates, each 6" x 1" and $\frac{3}{8}$ " thick. One of these plates

was tightly screwed to a heavy oak beam, and through it protruded two studs with threaded ends; the other plate fitted exactly over this one, the two being secured together by means of bolts on the studs. The wire hanging from the plates was about ten feet long, and carried at the bottom a scale-pan for holding the weights which loaded the wire.

The current was led to the wire by a heavy copper lead firmly soldered to the suspension plates, and led away by a light flexible copper wire soldered to the juncture of the test wire and the pan. In series with the wire, so that the same current passed through it, was a standard resistance. Light potential leads were neatly soldered to the test wire at points a measured distance apart; these led to mercury cups, from which they could be connected to the galvanometer and potentiometer. Potential wires from the terminals of the standard resistance, and also from a standard cadmium cell, led to other mercury cups to be connected at will with the galvanometer and potentiometer. (The purpose of the standard cell was to test the steadiness of the current.)

The source of current was a battery of four storage cells, of 200 ampere-hour capacity each, which could be connected for 2, 4, 6 or 8 volts as required. The current from this battery is remarkably steady, and by means of a very low resistance rheostat in the circuit the current was made to vary less than a few parts in 10,000. The current was never large enough to appreciably raise the temperature of the wire.

The standard resistance was one which has been used in various investigations carried out by Dr. Barnes. A description of it is given in his paper "On the capacity for Heat of Water between the Freezing and Boiling Points." (Phil. Trans., Series A, Vol. 199, 1902). The standard consists of two coils of resistances

$$\left\{ 1.00175 - .000250 (t - 20^{\circ}C.) \right\} \text{ and } \left\{ 1.00043 - .000246 (t - 20^{\circ}C.) \right\} \text{ ohms.}$$

These can be placed in parallel or in series.

The coils were kept at a constant temperature by keeping them immersed in a paraffin oil bath, which had in it a coil of metal tube through which a steady flow of cold water passed, the oil being constantly stirred by means of a small fan-screw revolved by a small water-motor. The supply of cold water was taken from a constant water head, arranged by running the water from a tap into a vessel with outflow and overflow tubes.

A thermometer in the oil bath gave the variations in the temperature of the coils. The Thompson-Varley slide that was used is the one used in the Macdonald Physics Laboratory for accurate potential work;

it was described by Professor Callendar in *Phil Trans., A*, 1902, p. 63. The potentiometer consists of two sets of coils, which are the potentiometer slide and the vernier slide. The former has one hundred and one 1000-ohm coils in series, and the latter one hundred 20-ohm coils in series. The terminals of the vernier slide are permanently fixed to the poles of a two-pole pointer on the potentiometer slide; by means of this arrangement the whole of the vernier coils is shunted with any two consecutive coils of the potentiometer slide, thereby throwing in parallel two resistances of 2000 ohms each, making an equivalent resistance of

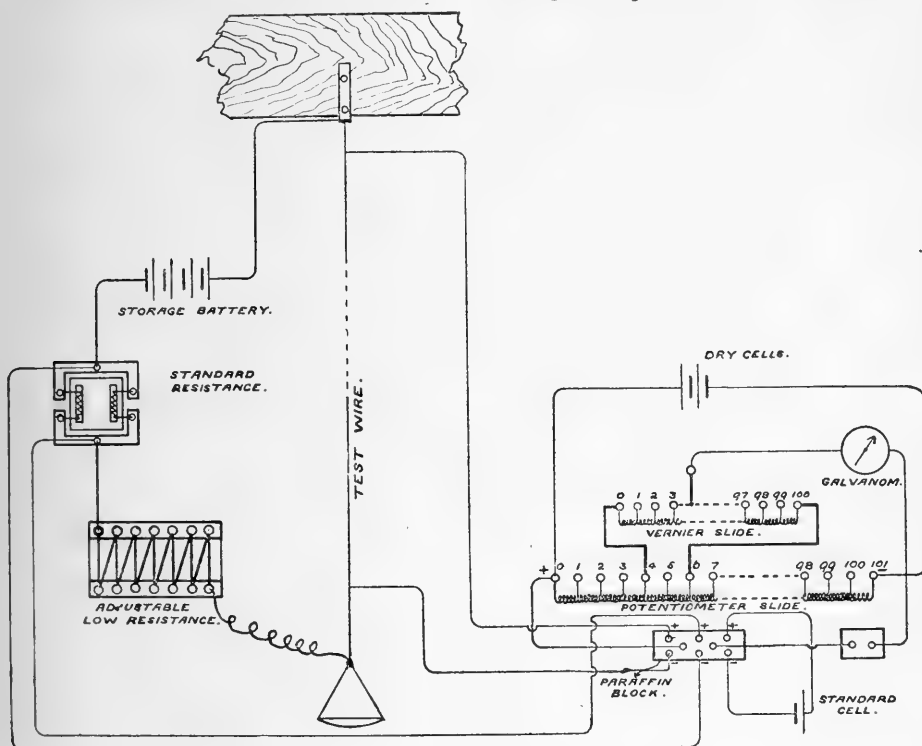


FIG. 1.

1000 ohms. Thus the resistance of the whole potentiometer is 100,000 ohms. The balance point is effected on the vernier slide by means of a pointer connected with the galvanometer. The galvanometer used was a Kelvin 100,000-ohm reflecting instrument.

The standard cell, used in connection with the potentiometer to test the steadiness of the current, was a cadmium inverted cell with an E.M.F. change of .0058 per cent. per degree of temperature.

The errors of the various coils of the potentiometer are less than 1 part in 10,000; determinations of the errors have agreed in all cases for the 101 coils to a tenth of this amount.

The potentiometer current was supplied by Columbia dry cells, either one or two as required. The current from this source is very constant, as the balance for the standard cell showed.

Four significant figures were obtained from the potentiometer readings, and the fifth from interpolation on the galvanometer.

In Fig. 1 the diagram of connections is shown.

Method of Experiment.

In all cases the wires were stretched below the elastic limit for a day or two in order to remove any possible kinks, and were then rested for at least an equal period.

The current used was as small as possible to give the necessary drop on the potentiometer; the heating effect was small, as a thermometer constantly touching the wire, showed. This thermometer indicated the changes of temperature of the wire, and corrections were afterward made for them. Weights were placed in the scale pan and the wire was allowed to extend. No readings were taken until everything in connection with current and temperature was constant.

The temperature of the room, where the wire was suspended, was very constant as the thermometer readings show.

If R_s is the standard resistance, E_s the drop across it; R_w the resistance of the test wire between potential terminals, and E_w the drop across it:—

$$\text{Then. Current} = \frac{E_s}{R_s} = \frac{E_w}{R_w}$$

$$\text{or} \quad R_w = \frac{E_w}{E_s} R_s$$

If P_w is the reading of the potentiometer for the drop across the wire, and P_s the reading for the drop across the standard then:—

$$\frac{E_w}{E_s} = \frac{P_w}{P_s}$$

or

$$R_w = \frac{P_w}{P_s} R_s$$

In this way the resistance of the wire, after the various extensions, was measured.

The values shown for specific resistance, in the tables given here, are calculated on the assumption that the volume of the wire remains con-

stant, no matter what the stretching may be . If l is the original length, and A the original cross-sectional area,

volume = $l A$

Then any cross-sectional area for a stretch of S will be

$$A_1 = \frac{l \cdot A}{(l + S)}$$

This is about as reasonable an assumption to make as any. In stretching the wire a number of things may happen which we cannot calculate for. For instance; little cracks, too small to be seen, may develop in the skin of the wire; one part of the wire may stretch out more than another owing to lack of uniformity in hardness or toughness.

It would be impossible to measure the changes in diameter by calipers; consequently, it is necessary to get a value for the cross-sectional area by making some assumption.

The weight per unit length of the wire could have been taken at the beginning, and the cross-section, after any extension, calculated from it. But calculations on this assumption would not include errors due to such causes as mentioned above, though it would have an advantage in avoiding errors due to any possible change of density caused by the strain, which errors are not included in the other assumption.

Assuming that the volume was a constant, and calculating the diameter after the total stretching, and comparing this value with the diameter measured by the calipers after all the stretching has taken place, we find the following close agreement:—

MATERIAL.	Initial Length.	Final Length.	Initial (Measured) Diameter.	Final (Measured) Diameter.	Final (Calculated) Diameter.
	Cms.	Cms.	Inches.	Inches.	Inches.
Constantin.....	266.4	300.4	.02210	.02023	.02058
Manganin.....	261.6	290.6	.01710	.01623	.01623
Rheotin.....	263.8	266.5	.02262	.02252	.02251
Copper.....	261.4	298.9	.03191	.02994	.02984
Aluminium.....	264.2	265.1	.03188	.03184	.03183
			A.	B.	C.

Columns A and B were obtained by taking many readings of the diameter, along the whole length of the wire, on micrometer calipers, and averaging; while the figures in C were calculated on the above assumption. It can be seen that, except in the case of constantin, they agree

very well with the measured diameter, and even in that case the difference is only a little over one per cent.

The curves shown in this part of the work are increase per cent. resistance on increase per cent stretch. Above the elastic limit, on account of the slow pulling out of the material, it cannot be said that the stretch is proportioned to the load; consequently, the increase of resistance is not plotted on a load base in these curves.

Below the elastic limit the extensions are proportional to the loads, so that this part of the curve would not be altered in either method of plotting.

Assuming that the specific resistance ρ does not change as stretching goes on, and that the volume of the wire remains constant,—then if R is the resistance, l the length, and A the cross-sectional area before stretching we have

$$R = \frac{\rho l}{A}$$

For any extension S of the wire,

$$R = \frac{\rho}{A_1} (l + S)$$

But

$$A_1 = \frac{l \cdot A}{l + S}$$

$$\begin{aligned} \therefore R_1 &= \frac{\rho}{l A} (l + S)^2 \\ &= \frac{\rho}{A} \left(l + 2S + \frac{S^2}{l} \right) \end{aligned}$$

$$\therefore \text{Increase of Resistance} = R_1 - R$$

$$= \frac{\rho}{A} \left(2S + \frac{S^2}{l} \right)$$

$$\frac{\text{Increase of Resistance}}{\text{Increase of length}} = \frac{\frac{\rho}{A} \left(2S + \frac{S^2}{l} \right)}{S}$$

$$= \frac{\rho}{A} \left(2 + \frac{S}{l} \right) = \frac{1}{l} \frac{\rho l}{A} \left(2 + \frac{S}{l} \right) = \frac{R}{l} \left(2 + \frac{S}{l} \right);$$

$$\text{or } \frac{\frac{\text{Increase of Resistance}}{\text{Original Resistance}}}{\frac{\text{Increase of length}}{\text{Original length}}} = 2 + \frac{S}{l}$$

To put this in words,—if the increase per cent resistance is plotted on increase per cent stretch, the curve is very nearly a straight line with slope equal to 2. The value of $\frac{S}{l}$ will not be appreciable below the elastic limit, nor will it be comparable with 2 for quite an amount of stretching beyond it. The greatest value obtained for $\frac{S}{l}$ was about .125.

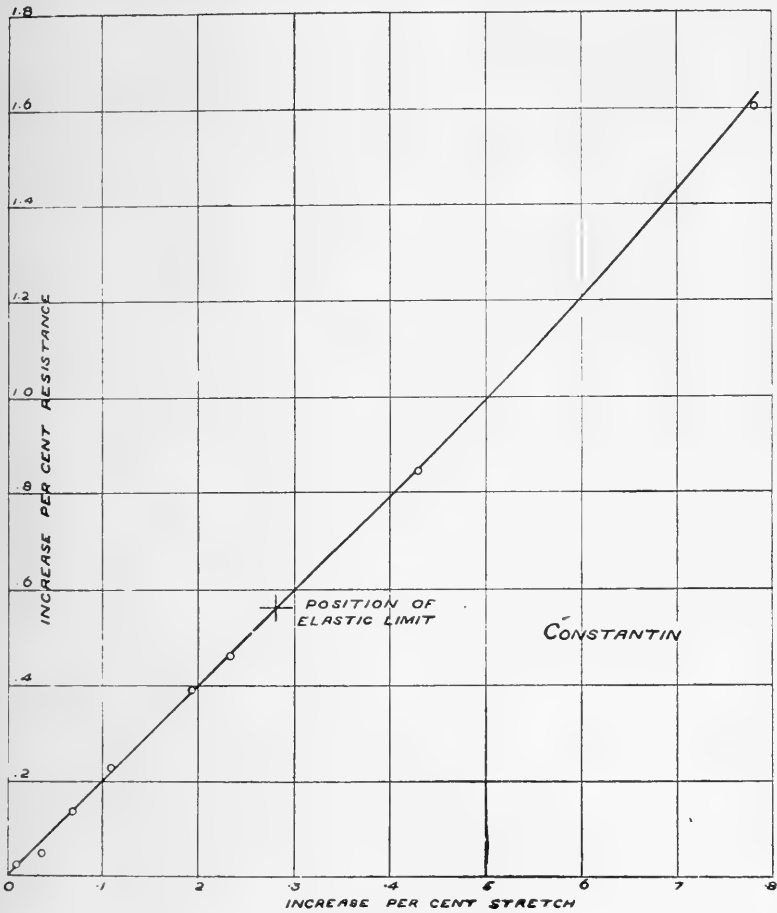


FIG 2.

On the above assumption, then, the curve of increase per cent resistance on increase per cent stretch should be a line with initial slope 2, curving slightly to a greater slope for greater values of stretching.

An examination of the curves will show that this is just what was obtained, the irregularities being usually at the first part of the curve,

where the increase of resistance is so small as to be hardly measurable, and accuracy cannot be depended on. This result is an evidence that the assumption on which the results are based is not far astray.

Constantin.

A piece of wire of the same material as described in my paper on "The Effect of an Electric Current on the Modulus of Elasticity" was used. Results are given on data sheet P. Fig. 2 shows the increase per cent resistance on per cent stretch, up to a few points beyond the elastic limit the position of which is marked on the curve. This curve is a straight line with slope equal to 2.

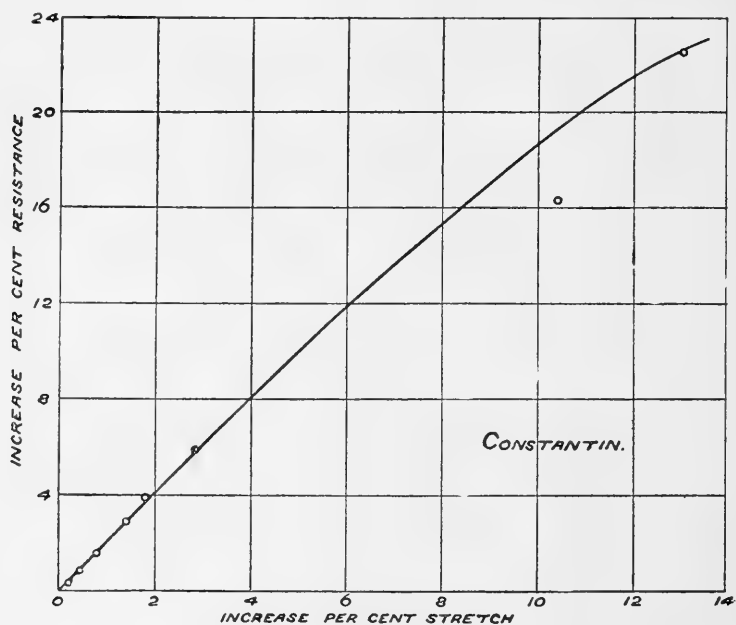


FIG 3.

Fig. 3 corresponds to the full extension undergone by the wire. This curve bends in the direction opposite to that which we should expect, owing to the low value for specific resistance which the calculations for the last four points show. (See data, Sheet P.) It must be noted that the extensions corresponding to these points were obtained simply by pressing downward on the scale pan with the hand, the material being so plastic as to allow this to be done with ease. Probably a large part of this extension took place just at the suspension, for it was noticed that in all cases, whenever the wire broke, this was where the breaking took

place. This would explain the low values for the specific resistance. It is hardly probable that the specific resistance does decrease at this stage of stretching.

In order to be sure of the temperature coefficient of this specimen of constantin a special determination was made. The result showed that the coefficient varied greatly at different temperatures, but at the temperature of the test wire in his work it was practically negligible, being not more than .00001. with minus sign.

DATA SHEET P.

Constantin.

Standard resistance used = 2.00218 - .000496 ($t - 20^{\circ}\text{C.}$)

Temperature Coefficient of test wire = -.00001.

Load, Gms.	Percent. Stretch.	R. of Wire corrected to 22.22°C	Increase of R. of Wire.	Increase percent. of R. of Wire.	Specific R. of Wire.
					.0000
.515	0	5.46417	0	0	5138
1015	.00984	5.46561	.00144	.02634	5138
2015	.03664	5.46782	.00365	.04850	5137
3132	.16966	5.47148	.00731	.1337	5138
4298	.1108	5.47672	.01255	.2297	5138
5393	.1957	5.48568	.02151	.3935	5138
5693	.2355	5.48934	.02517	.4605	5137
6193	.4320	5.51041	.04624	.8460	5137
6493	.7825	5.55188	.08771	1.605	5140
6993	1.408	5.62507	.1609	2.942	5143
7293	1.813	5.67861	.2144	3.924	5144
7993	2.838	5.78867	.3245	5.940	5147
"	10.420	6.35729	.8931	16.32	4903
"	13.080	6.69108	1.2269	22.44	4923
Wgts. { off					
515 {	12.78	6.65796	1.1938	21.84	4923
515 {	12.78	6.65493	1.1908	21.80	4921

* Extension caused by pulling out wire with the hand. Values given probably do not represent the correct Specific Resistance for these extensions.

Manganin.

This piece of manganin must have had more than the usual percentage of copper in its composition, for it was very soft, and had a much lower specific resistance than is usually given for this material

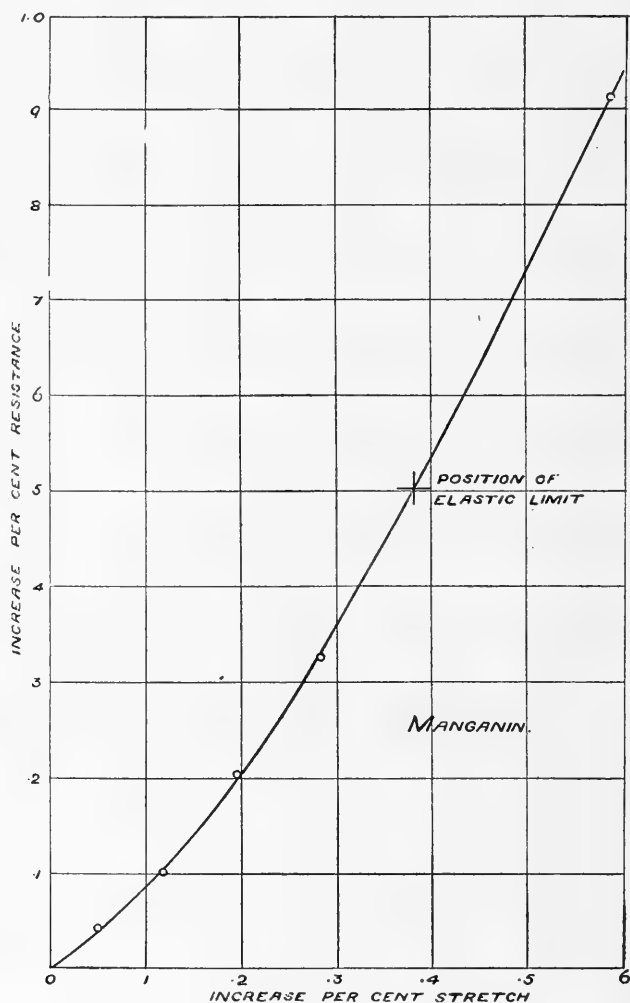


FIG 4.

Fig. 4 shows the relation of increase per cent resistance to increase per cent stretch, for stretchings just beyond the elastic limit.

Fig. 5 shows the same relation for the total stretch.

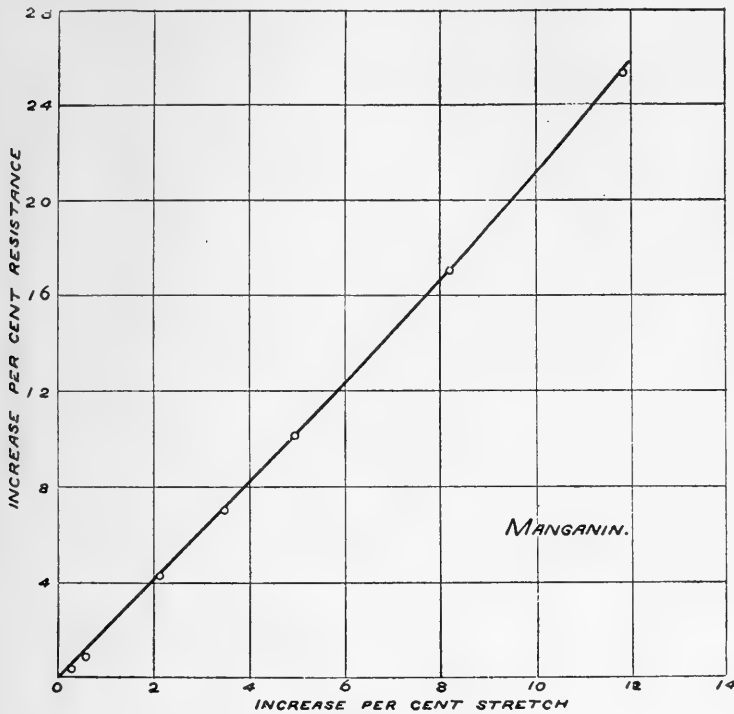


Fig 5.

The following table gives the result of a few of the calculations for specific resistance.

Load Gms.	Per cent. Stretch.	Increase Per cent. Resistance.	Specific R.
515	0	0	.00003882
2515	.1194	.1019	3877
4265	.2816	.3259	3873
5265	2.212	4.277	3875
5865	4.940	10.10	3882
6365	8.210	17.03	3881
Weights off			
515	11.120	24.70	3921

Rheotin.

This specimen was a piece of the same material as was described in the previous paper mentioned above. The resistance-temperature coeffi-

cient was not known, and a special determination of it was necessary. It was found that the increase of resistance caused by elevation of temperature was very steady, varying directly as the temperature with coefficient $+ .000246$ per 1°C .

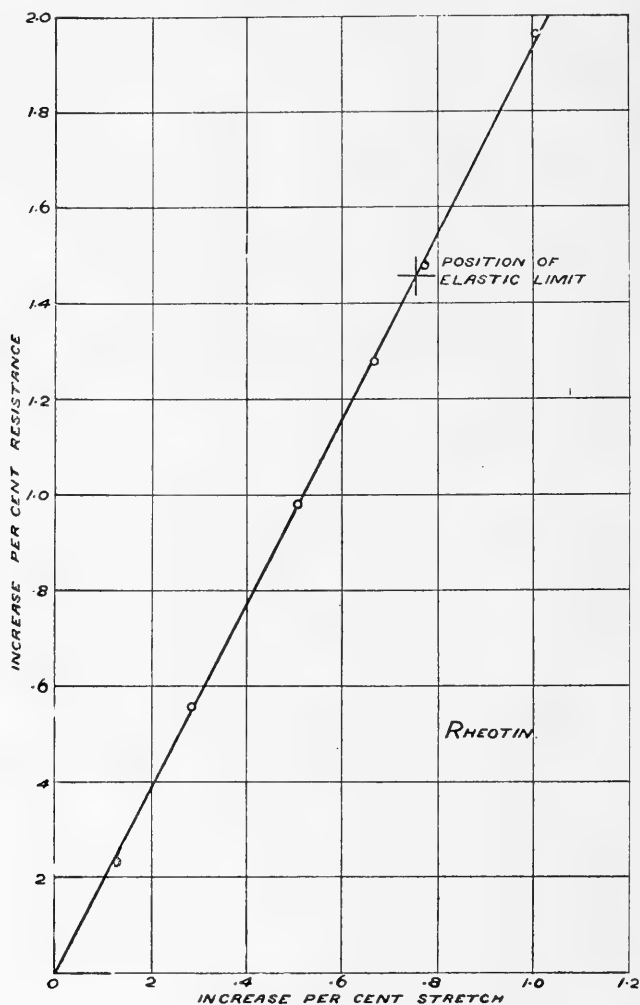


FIG 6.

The load was varied from 515 gms. to 25,722 gms., when the wire broke. The corresponding stretch per cent. varied from 0 to 1.007, and the specific resistance from .00004928 to .00004925. Fig. 6 shows the result.

Copper.

This specimen of copper must have been of only moderate purity, for the value obtained for its specific resistance was higher than that given for very pure copper. Figs. 7 and 8 show the result obtained:—

Load Gms.	Per cent. Stretch.	Increase Per cent. Resistance.	Specific Resistance.
1515	0	0	.000001744
2515	.01807	.05985	1744
4707	.4610	.9590	1744
5457	1.343	2.914	1747
6457	2.773	5.865	1747
7409	4.385	9.140	1747
8409	6.553	13.82	1747
9409	9.625	20.25	1745
Weights off	14.38	31.60	1748

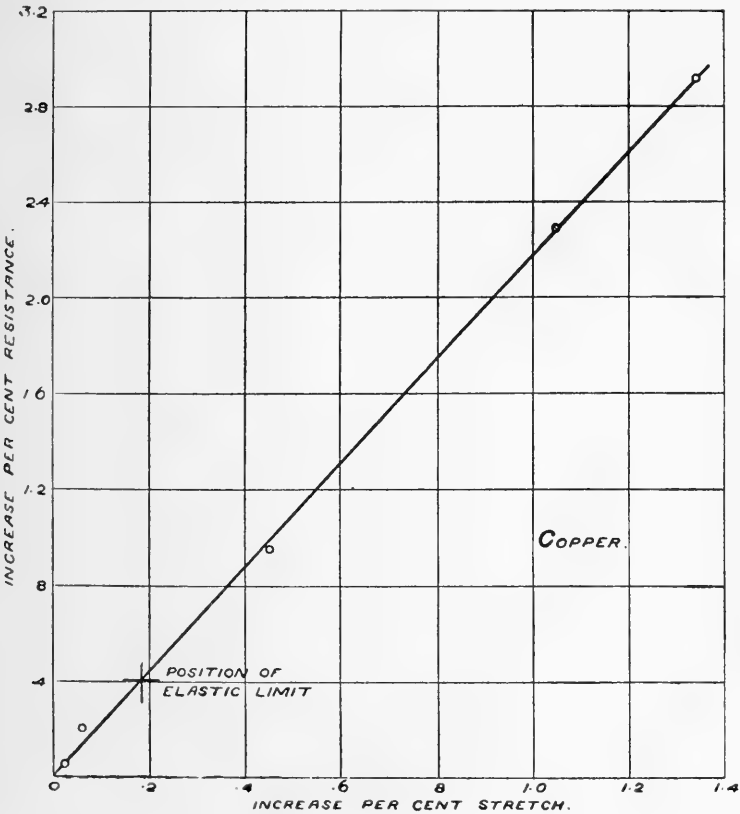


FIG 7.

Aluminum.

The specimen was a length of ordinary aluminum wire such as is used for commercial purposes.

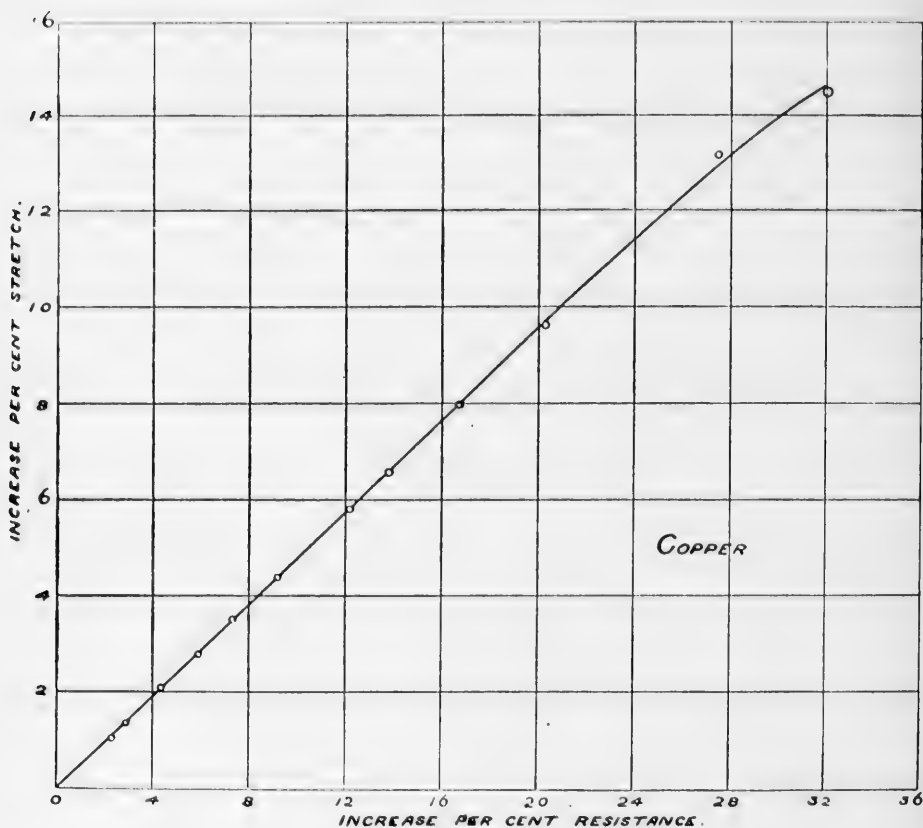


FIG 8.

As the potential leads could not be soldered to the wire, they had to be secured by winding them around the wire and covering the joint by a globule of hard brittle wax.

The following, with Fig. 9 and 10, are the results:—

Load Gms.	Per cent. Stretch.	Increase Per cent. Resistance.	Specific Resistance.
515	0.0000	0.0000	.000002927
1515	.04747	.00603	2924
2515	.07743	.00947	2923
3515	.1093	.0405	2922
4515	.1425	.1033	2922
5515	.1840	.1580	2921
6515	.2420	.2574	2920
7526	.3086	.3467	2919

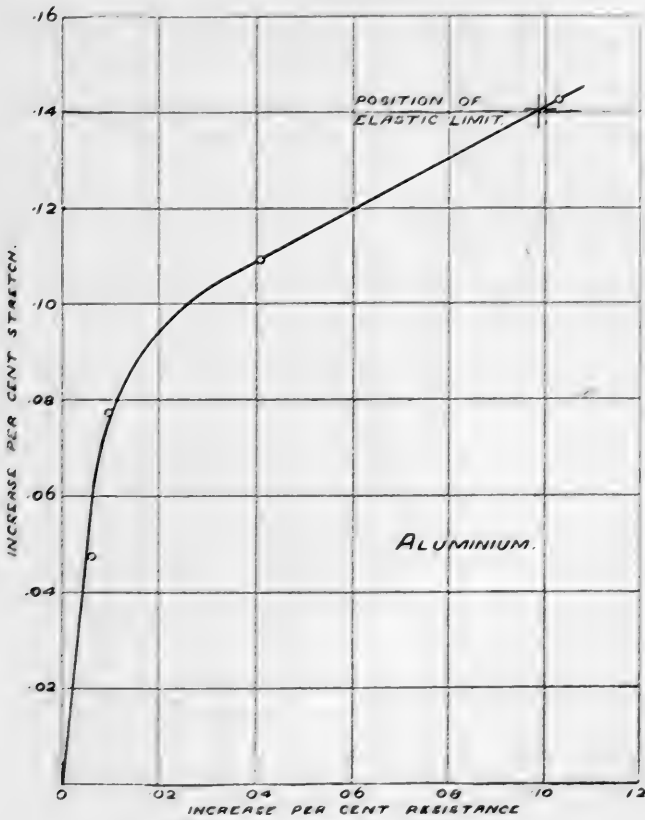


FIG 9.

Conclusion.

As can be seen from the curves, in all materials tested, except Aluminium, the ratio of increase per cent resistance to increase per cent stretch is equal to 2+. Manganin and Aluminium in the first parts of the curves show discrepancies, but this is probably due to the unavoidable errors in measuring such minute changes of resistance.

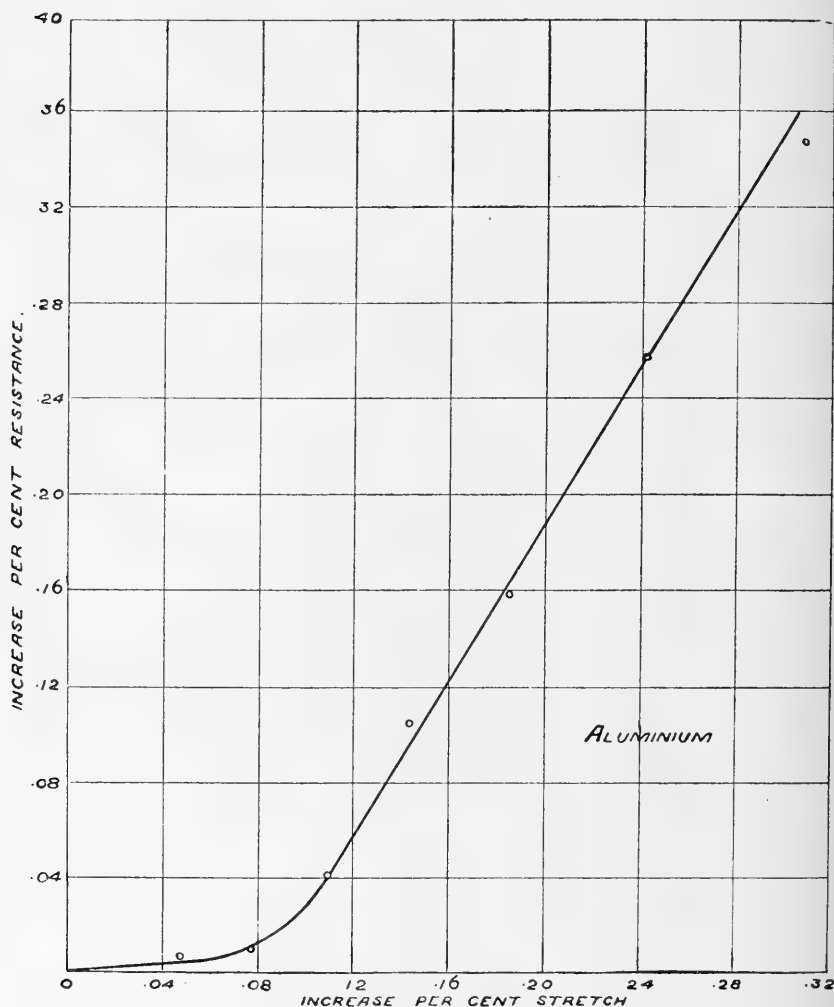


FIG 10.

In the case of Manganin, when these irregularities are omitted, the above ratio has the value 2, but for Aluminium it is a little less. But in the case of the latter the wire broke when there was a stretch of only 8 cms. in 264; in consequence, the changes of length and of resistance were so small that no general result can be deduced from them.

The last four points of the Aluminium curve showed that the slope was increasing, and, probably, if greater extensions could be obtained, the results would agree with those obtained for the other materials.

These irregularities, in the Manganin and the Aluminium curves, were too small to make any appreciable change in the calculations for specific resistance.

The values obtained in all cases for the specific resistance, working on the assumption that the wire has constant volume, are remarkably constant.

As in all work done heretofore on this subject, the conclusion is that a longitudinal tensile stress produces practically no change in the specific resistance of the material. At least, it produces no immediate change; whether, after a prolonged action of the stress, there would be a change or not, is perhaps open to question. The changes in specific resistance for copper and aluminium, in this work are smaller than those obtained by Tomlinson and by Gray and Henderson in their work. Tomlinson says that the specific resistance of Aluminium is actually decreased by a stress in the line of flow of the current. This also shows here in the results for Aluminium, but the change is only in the fourth significant figure, and that perhaps is too fine a distinction to depend on.

As a general conclusion, this work points to the fact that for alloys and metals, while they are under a tensile stress, the increase per cent resistance is about twice the increase per cent stretch, and that the specific resistance of the material is practically unchanged.

It is interesting to finish this paper with a contrast between the small effect of a tensile stress (or, for that matter, of any mechanical treatment) on the electrical properties of a metal or alloy, and the great effect of even a trace of impurity.

This is well shown by the following table, taken from Vol. 2, p. 299. Mathematical and Physical Papers, Kelvin.

Qualitative Analysis.	Percentage Cu.	Percentage Impurity.	Relative Conductivity
Cu, Fe, Ni, As, O.....	98.76	1.24	42.0
Cu, Fe, Fe, O	99.20	0.80	71.3
Cu, Fe, Ni, (doubtful), O.....	99.53	0.47	84.7
Cu, Fe, Ni, (doubtful), O..	99.57	0.43	86.4
Cu, Fe, O.....	99.90	0.10	102.0

It can be seen, that the purity of the material to be used for a conductor is of the first importance, while the mechanical treatment of it is of minor consideration as regards its purely electrical properties.

I desire to thank Dr. Barnes for his advice in this work.

XII.—*A Method of Determining the Specific Heat of a Gas at Constant Pressure.*

By H. F. DAWES, M.A., University of Toronto.

(Communicated by Prof. J. C. McLennan, and read May 23, 1906.)

The classical determination of this constant for several gases was made by Regnault.¹ His method consisted in passing a stream of heated gas through an ordinary water calorimeter and determining the quantity of heat given up by observing the rise in temperature of the water. The quantity of gas used in any experiment was determined from observations on the pressure, and the temperature of the gas together with the volume of the reservoir in which it was stored. The gas was heated by passing it through a long spiral tube of copper immersed in a bath of boiling oil. From the heating bath it passed directly into the calorimeter traversing it in a spiral copper tube. It was assumed that the air entered the calorimeter at the temperature of the oil bath, and left it at the temperature of the water.

Besides the heat given up by the gas a certain amount was communicated to the calorimeter by conduction and by radiation both from the bath and from other bodies in the room. In order to determine the amount of heat derived from these sources observations were made on the temperature of the calorimeter for a certain time before the gas was allowed to pass through and again after the flow was stopped.

Defects.

In attempting to repeat this experiment with apparatus precisely similar to that used by Regnault it was found that the arrangement had several disadvantages. In the first place the calorimeter used was not very delicate, *i.e.*, it required a comparatively large quantity of heat to make a sufficiently great difference between the initial and final temperatures of the calorimeter.

Since both the specific heat and the density of a gas are very small, it is necessary to use a large quantity of gas and to make the initial temperature very high in order to have the required quantity of heat available. To obtain a sufficiently high temperature, boiling oil was used in the heating bath and this made the experiment very disagreeable and difficult to work with.

¹ Regnault. *Memoires de l'Academie des Sciences de l'Institut Imperial de France*. Tome XXVI. pp. 1-112.

Again, with Regnault's apparatus, the arrangement for measuring the initial temperature of the gas was somewhat defective. On account of the very rapid fall of temperature along the tube through which the gas passed from the oil bath to the calorimeter it was scarcely permissible to assume that it entered the calorimeter at the temperature of the oil bath.

II.—*The Bunsen Ice Calorimeter.*

A modified form of the calorimeter used by Regnault for the determination of the specific heat of gases is also used to find the specific heat of liquids or solids. Another form of calorimeter which has been used for liquids and solids but not for gases is the Bunsen Ice Calorimeter. The construction of this type of calorimeter is shewn diagrammatically in Fig. 1. A glass test tube B is sealed into the upper end of a larger cylindrical glass vessel A. The lower end of A is joined to a U tube AC which carries a cup C at its upper end. A hollow stopper furnished with a three way tap D prolonged into a graduated capillary tube E is fitted into this end. By means of this tap communication can be made from the cup D, which the stopper carries, either to C or to E or from C to E.

In setting up the instrument for use the upper part of A was filled with pure distilled water free from air, and lower part of A, the tube C and part of the capillary with pure boiled mercury. By means of the tap D the end of the mercury thread could be moved to any selected position.

A part of the water in A was frozen and formed into a cap of ice around the immersed part of B as indicated in the diagram. In making all measurements, A, B, and the lower part of C were kept surrounded by ice in order to maintain the apparatus at zero temperature.

The measurement of heat by this calorimeter depends on the fact that water changes its volume on solidifying. If a quantity of heat is communicated through B to the water in A a certain quantity of ice will be melted. This will cause a diminution in the volume of the contents of A, and a consequent receding of the mercury thread in E. From the known values of the latent heat and the specific gravity of ice, the amount of heat communicated may be determined for any change of volume produced.

An investigation with this type of calorimeter shewed that its delicacy was such that an addition of one calorie made a change of about 1 1-3 millimeter divisions in the position of the end of the capillary thread. With the apparatus used by Regnault, on the other hand, an addition of about 600 calories was required to make a difference of one

degree in the thermometer reading. Besides its greater sensitivity the Bunsen calorimeter possesses the advantage of not requiring any correction for radiation errors since no heat is communicated by this means on account of the surrounding ice jacket.

III.—NEW METHOD.

A.—*Apparatus.*

In the experiment described below a method was devised by which this calorimeter could be used with special advantage in determining the specific heat of a gas, and at the same time some of the defects of the Regnault arrangement avoided. Fig. 2 is a diagram of the arrangement of the apparatus as finally adopted after considerable development. The gas was stored under pressure in a reservoir A and kept at zero temperature by means of ice in the vessel surrounding it. The flow of gas was regulated by a valve B, and its pressure was indicated by a water manometer C. A phosphoric pentoxide drying tube D was inserted in its path to absorb any moisture coming from the manometer. The gas was heated as it passed through a tube in a water bath E and was kept at a temperature of 100° as far as the mouth of the calorimeter by means of a steam jacket. It passed through the test tube of the calorimeter F in a copper tube of special construction shewn on a larger scale in Fig. 3. The gas entered this tube through the inlet *d* and issued from it by the outlets *a* and *b*, each of which could be closed by a valve. The lower part of the tubing was coiled, as shewn in the figure, and immersed in water to the height *e*. With the valve *b* open and *a* closed the gas passed directly out without going through the bent portion of the tube. The difference of temperature between the points *c*, *d*, was measured by means of a copper-iron thermocouple, the wires of which passed out through air-tight caps at *a* and *b*, and thence to a galvanometer.

B.—CALIBRATION.

(1) *The Thermocouple.*

The thermocouple was calibrated before the wires were sealed into the tubes, one junction being kept in melting ice and the other placed in a water bath along with a standard thermometer. The deflections of the galvanometer were observed for a series of different temperatures, and the results are shown in Fig. 4.

(2) *The Gauge.*

The relation between the quantity of gas which passed out of the reservoir and the corresponding fall of pressure was found in the follow-

ing way. The volume of the reservoir was 7 litres, so that it contained 7 m grams of gas at standard temperature and pressure, m being the mass of one litre. Hence by Boyle's Law, for every millimetre fall of pressure $7m/760$ grams of gas must have escaped. The calibration of the gauge was checked by means of a mercury manometer, and its readings reduced to millimeters of mercury. In an experiment with atmospheric air for which $m=1.293$ the quantity of air which issued from the reservoir was calculated for a series of different pressure falls and the results of this calculation are exhibited in Fig. 5. In this figure the ordinates represent the quantities of air which escaped when the pressure fell to zero from the values indicated by the corresponding abscissæ.

(3) *The Calorimeter.*

The bore of the capillary tube of the calorimeter was calibrated by filling it with mercury and then running it out a little at a time and weighing the parts run out. From this the mass of mercury occupying each division was found for different parts of the tube.

The number of calories required to cause a displacement of one gram was found as follows:—

Data:—

1 gram of water gives out 80.025 calories on freezing.

1 gram of water occupies 1.00013 c.c at 0°C .

1 gram of ice occupies 1.090×1.00013 c.c at 0°C

1 gram of mercury occupies .073553 c.c at 0°C .

Solution:—

80.025 calories used in melting ice cause a change in volume of
 $1.00013 \left\{ 1.090 - 1 \right\}$ c.c. and therefore cause a displacement of
 $1.00013 \left\{ 1.090 - 1 \right\} \times \frac{1}{.073553}$ grams of mercury.

Hence a displacement of one gram of mercury means the using of
 $\frac{.073553 \times 80.025}{1.00013 (1.090 - 1)}$ calories = 65.4 calories.

From this value the number of calories causing a displacement of one division at different parts of the scale was found. The results of this calibration are illustrated by Fig 6, which shows at any point the number of calories corresponding to a displacement of the mercury from zero of the scale to that point.

A preliminary experiment showed that the fall of pressure of the gas in passing through the calorimeter was less than one fifth the pressure indicated by the manometer C.

C. Method of Experiment.

In making a determination the following procedure was adopted. When the water in E had been raised to the boiling point the valve *a* was opened, and the gas allowed to pass through the apparatus. Readings were taken on the calorimeter scale, and on the gauge and on the thermocouple scale respectively once a minute. B was adjusted as required to keep the gas flowing uniformly. The water manometer C was maintained at a difference of level of eight millimeters, so that the fall in pressure of the gas as it passed through the calorimeter was less than $8/5$ millimeters of water. The galvanometer in a few minutes assumed a constant deflection, showing that the temperature of the *d* junction had become steady. From the calorimeter readings the average number of divisions per minute was determined by finding, first, the average number per twenty minutes from a number of sets of readings, and then taking one twentieth of that number. The rate of fall of pressure was found in a similar manner from the readings of the gauge.

After the gas had been flowing for a sufficient time, the valve *b* was opened and *a* closed, so that the gas passed out without going through the coil. The rate of flow was adjusted so that the thermocouple *d* was kept at a temperature used in the previous observations. Readings of the calorimeter and of the thermocouple scales were taken once a minute as before, and the average number of divisions per minute on the calorimeter scale was found in the way explained above.

From these readings the following deductions were made:—

- (1) The temperature in degrees centigrade corresponding to the thermocouple deflection was found from the curve of Fig. 4.
- (2) The number of grams of gas per minute was found from the rate of fall of the pressure by means of curve 5.
- (3) By the aid of curve 6 the number of calories communicated per minute to the calorimeter was deduced from the number of divisions moved over per minute by the mercury thread.

D. Theory.

It will be seen that with the exception of the air which passed through the coil (*e*) during the first set of observations the sources of

heat in the two cases were exactly the same. Hence if " x " calories per minute were communicated in the first case, and (" x_0 ") per minute in the second, the gas must have given up $(x - x_0)$ calories per minute. If therefore the rate of flow was " y " grams per minute, and the fall of temperature " $t^\circ\text{C}$ " the value of the specific heat as given by this set of readings was $\frac{x - x_0}{yt}$

E. Measurement of Specific Heat for Dry Air.

A set of temperature, pressure, and calorimetric readings for dry air is given in Table I, and curves illustrating them are shewn in Fig. 7.

TABLE I.

Time.	Gauge.	Time.	Calorimeter Scale.	Thermocouple Scale.
0.	22.9			
.30	22.7	1	554.4	
1.30	22.1	2	560.3	65.5
2.30	21.6	3	566.4	65.
3.30	21.3	4	572.9	64.5
4.30	20.9	5	579.	64.5
5.30	20.6	6	585.1	64.
6.30	20.1	7	591.8	64.5
7.30	19.9	8	598.	64.5
8.30	19.55	9	604.1	64.5
9.30	19.2	10	610.3	64.5
10.30	18.9	11	617.	64.5
11.30	18.6	12	623	64.5
12.30	18.5	13	629.9	64.5
13.30	18.2	14	636	64.5
14.30	18.	15	642.4	64.5
15.30	17.5	16	649	64.5
16.30	17.1	17	655.2	64.5
17.30	16.7	18	661.8	64.5
18.30	16.4	19	668.5	64.5
19.30	16.2	20	675.0	64.5

TABLE I—(Continued.)

Time.	Gauge.	Time.	Calorimeter Scale.	Thermocouple Scale.
20.30	15.8	21	681.6	64.5
21.30	15.1	22	688.2	64.5
22.30	15.	23	694.9	64.5
23.30	14.6	24	701.3	64.5
24.30	14.2	25	708.	64.5
25.30	14.	26	715	64.5
26.30	13.6	27	721.3	64.5
27.30	13.3	28	728	64.5
28.30	12.95	29	734.9	64.5
29.30	12.4	30	741.5	64.5
30.30	12.	31	748.5	64.5
31.30	11.6	32	755	64.5
32.30	11.4	33	762	64.5
33.30	11.	34	769	64.5
34.30	10.7	35	775.4	64.5
35.30	.....	36	782	64.5
36.30	10.35	37	789.1	64.5

The first of these curves (A) shews that after the first few minutes the temperature became steady and remained so during the experiment. The second and third (B and C), shew respectively that the air flowed through the calorimeter uniformly, and that the heat was communicated to it at a uniform rate.

The determination of the value of the specific heat at constant pressure for air from this set of readings is summed up in the following:

Denoting the rate of motion of the calorimeter thread when the air was flowing through the coil by A, and when it was issuing from the outlet *b* by B, the results obtained were as follows:—

Average value of A = 6.612 divisions per minute.

Temperature fall between terminals of thermocouple = 21.9°

Average value of B = 4.982 divisions per minute.

Temperature fall = 21.8°

Reduced value of B corresponding to temperature fall of 21.9° = 5.0071 divisions per minute.

- I.—Calorimeter scale divisions due to the heat from the air = $(6.612 - 5.0071) = 1.6049$. From Fig. 7 and its corresponding readings the number of calories per minute due to the heat imparted by the air = 1.20327.
- II.—Average fall of pressure = .3399 [gauge divisions per minute, = 17.09 mm. mercury per minute and consequently the average rate of flow = .20355 grams per minute.
- Combining I and II the value .2697 was obtained for the specific heat at constant pressure.

F. Discussion.

In the published account of the experiments in which he determined this constant, Regnault gives the results of eight-four determinations. These vary from .22 to .24 the average value being .2375. The result found from the observations given above, while somewhat higher than those found by Regnault is still sufficiently near to his values to demonstrate the usefulness of the method.

G. Alterations Suggested.

One or two changes in the arrangement have suggested themselves, but owing to lack of time, have not as yet been tried. In the first place the junction of the two tubes at d might be made quite near to the upper end of the test tube of the calorimeter, and the thermojunction moved up to correspond. This would not alter " x " as used in the above discussion, but would make a much greater value of " t " and a correspondingly smaller value of " x_0 " since the heat given up by the air between the present position of d and that suggested is at present included in " x_0 ." Again, an ebonite connection in the tube d would lessen the conduction from the steam jacket, ebonite being a poor conductor of heat. This would lessen the values of " x " and " x_0 " by equal amounts. Both these changes would lessen the percentage error in the final result.

H. Advantages of the Method.

Some advantages of this method over that used by Regnault may be enumerated.

(1) By this method the calorimetry is more perfect than in the experiments of Regnault, since the calorimeter (a) is very much more sensitive and (b) it requires no correction for radiation on account of belonging to the constant temperature type.

(2) Heat communicated by all sources other than the gas itself, for example, by conduction from the steam jacket down the tube, d , and from the air of the room down a and b , is accounted for by a single direct observation.

(3) Again, in this method the measurement of the initial temperature of the gas is exact, since all heat given up by it after it passes the thermocouple is accounted for in the calorimeter readings.

(4) It is necessary to heat the gas only to a comparatively low temperature in order to have as favourable a determination as that of Regnault with the very high temperatures he used. Hence the disadvantages and limitations of using boiling oil as a heating bath are avoided. The method may be readily applied to gases which are decomposed at high temperatures.

(5) The determination of the specific heat of a gas is reduced to the measurement of rates, so that the initial and final adjustments of conditions have not to be considered or allowed for.

(6) The method may be readily adapted to the measurement of the specific heat of liquids so that it gives promise of becoming generally useful.

The writer would in conclusion express his sincere thanks to Prof. J. C. McLennan for his kindly interest in this investigation, and his helpful suggestions during its progress.

Physical Laboratory, University of Toronto.

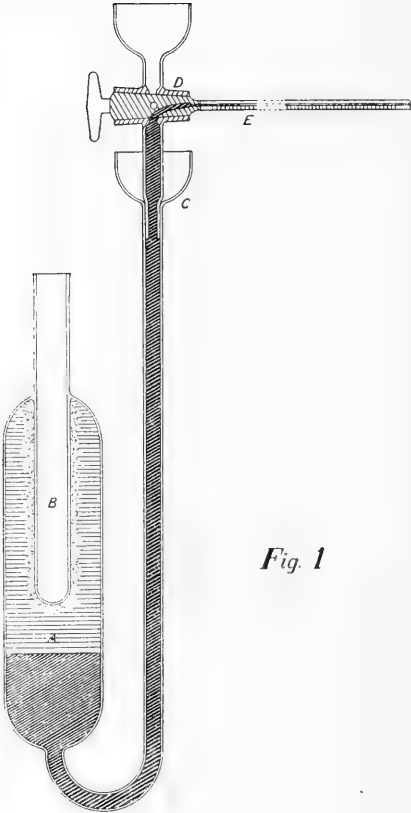


Fig. 1

Fig. 2

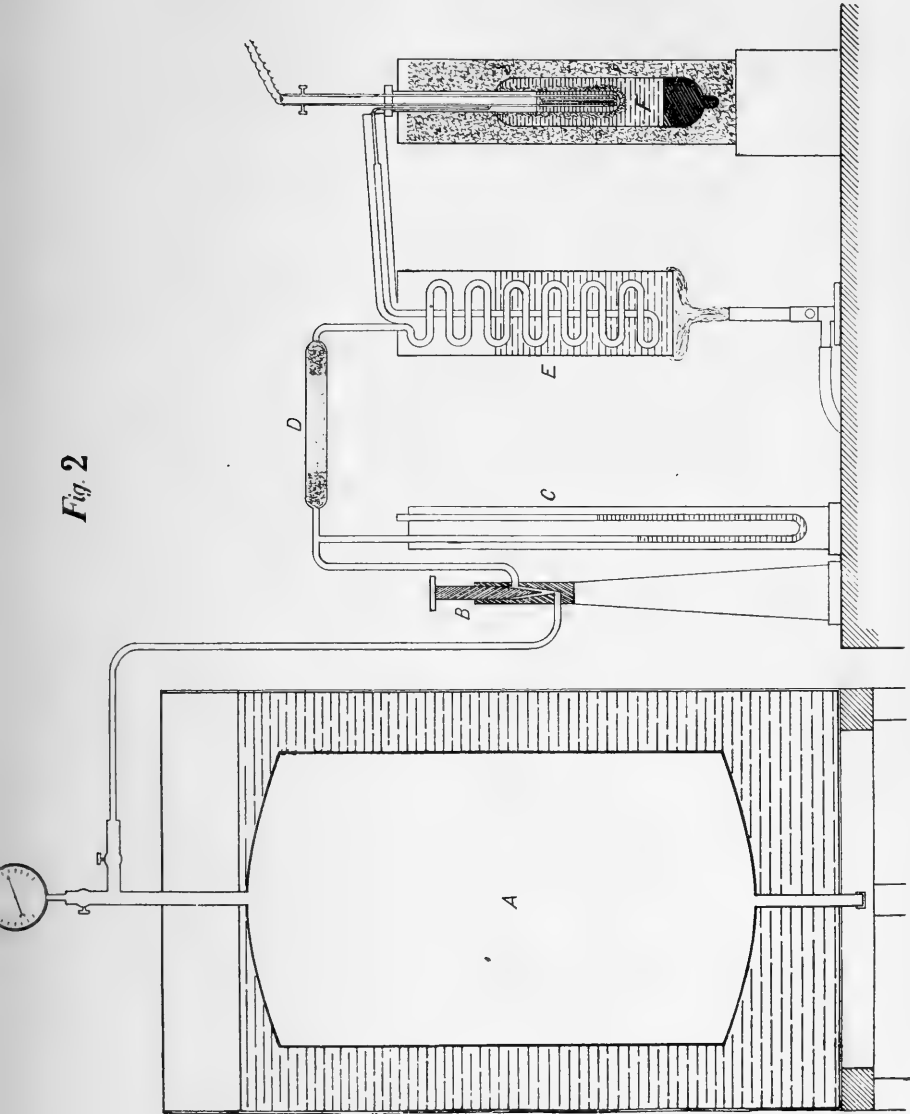


Fig. 3

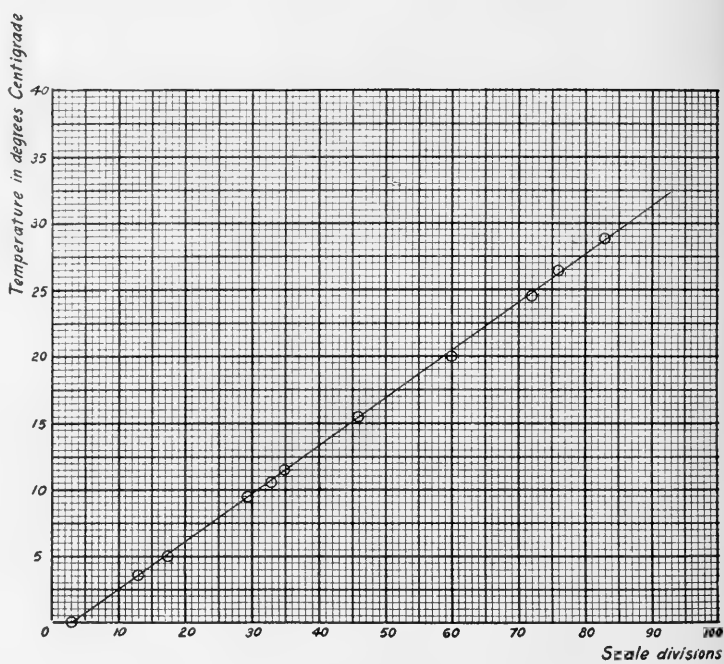
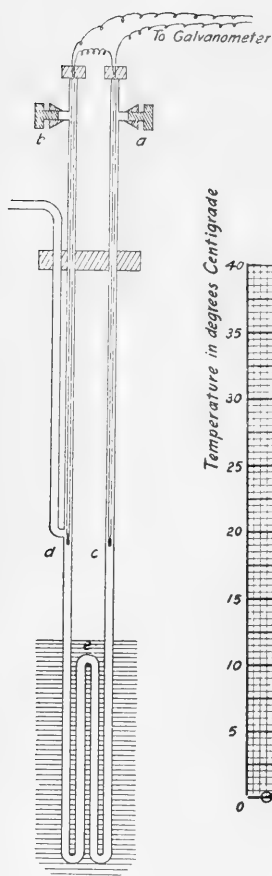


Fig. 4
Calibration of Thermocouple

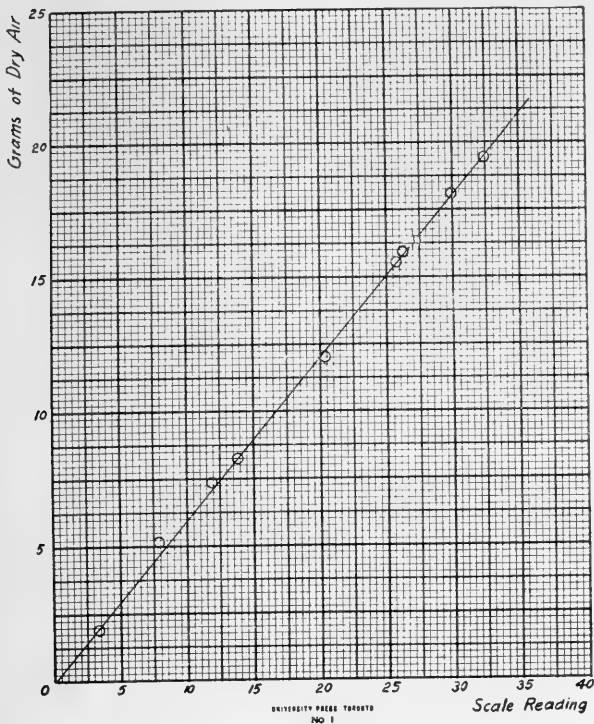


Fig 5
Calibration of Gauge

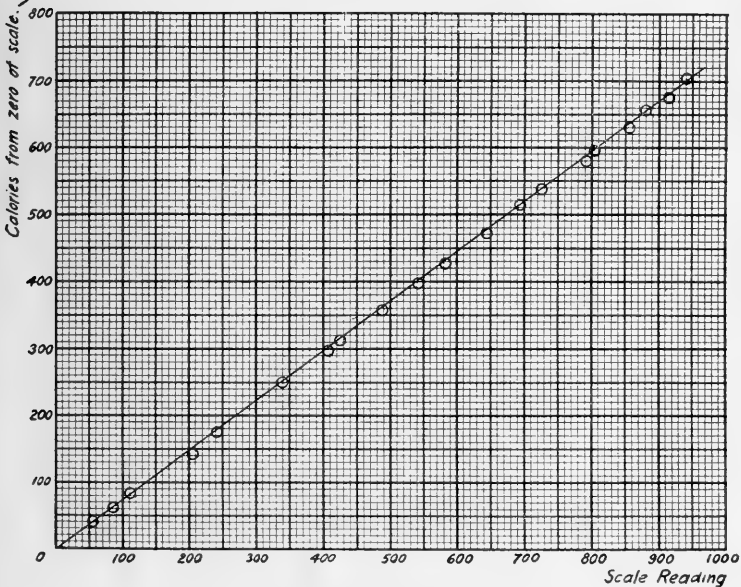


Fig. 6
Calibration of Calorimeter

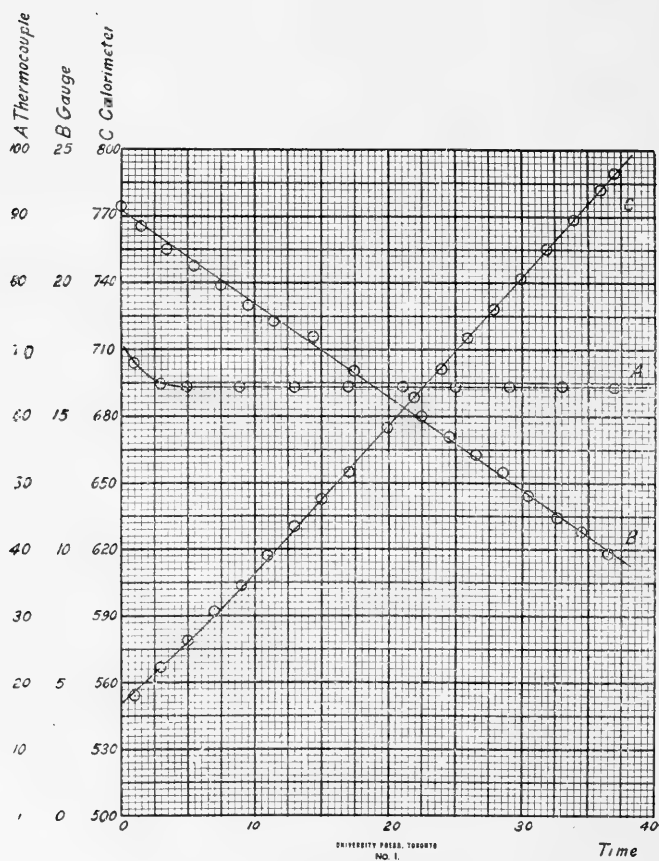


Fig. 7

A Readings of Thermocouple
 B " " Gauge
 C " " Calorimeter

XIII.—*Deficient Humidity of the Atmosphere.*

By T. A. STARKEY, M.B., D.P.H., F.R.S.I., Professor of Hygiene

AND

H. T. BARNES, D.Sc., F.R.S.C., Associate Professor of Physics, McGill University, Montreal.

Read May 23rd, 1906.

The importance of the influence of a dry atmosphere on the human organism has been in a great measure overlooked. The question is one of great moment in Canada, especially in those parts where, during the colder months, the heating of the houses necessitates the heating of the indoor atmosphere, thereby causing a tremendous drying of the air, or in other words, a lowering of the *Relative Humidity*.

This excessive dryness is common knowledge, and most householders are fully acquainted with the ravages it creates amongst their household effects, particularly woodwork, ivory pieces, etc. How many attempts on the part of the householders has one witnessed, to increase the moisture necessary in the air—hanging cans containing water on the heating coils—placing bowls of water in each room, etc., etc. But all these attempts were made with a view simply to preserving the furniture, ornaments, etc., and never to benefit the health of the inmates.

The results of these homely makeshifts were always disappointing, because the amount of water which could be evaporated under such conditions as above described, did not sensibly affect the humidity conditions—as will be shown later, several gallons per day in an ordinary sized house are required to even bring the relative humidity to 50 per cent.

The action of a dry atmosphere on the human organism is a direct one. It affects primarily the mucous membranes lining the respiratory tract—chiefly that of the nose, the throat and the bronchial tubes. It is a purely mechanical irritant, resulting in a condition of congestion of the mucous membranes before mentioned. If this irritation be continued for any length of time the swollen mucous membranes with difficulty regain their normal state, and in this connection it may be pointed out that different individuals will suffer to different degrees, according to their personal factor or idiosyncrasy—there are some people whose mucous membranes are “weak” and will quickly react to this irritation; finally, what is more important in these cases, the mucous membranes do not recover their normal tone, or only with very great difficulty after a long time.

We have thus all the conditions favourable for a chronic catarrh, and this chronic condition being established we get all the typical symptoms of naso-pharyngeal catarrh, spreading often to the Eustachian tubes communicating with the middle ear. When this chronic congestion of the naso-pharynx continues for an extended period in young children, we often have the starting point of adenoid growths, a troublesome affection and one which is very widespread throughout communities. Continuing downward along the respiratory tract, the conditions resulting from the irritation, due to an excessively dry atmosphere, must be noted with reference to the bronchial tubes, and the small air passages in the lungs. Here again a congestion is the primary result, and the effects produced must be considered from a double point of view:

First: On the normal healthy lungs and bronchi.

Second: On diseased lungs and bronchi.

To take the second series first will perhaps serve us better. When considering the effect of an irritation due to dry air on a mucous membrane already irritated or congested by some disease, e.g., Tuberculosis, Bronchitis, Pneumonia, etc., no one can deny for a moment the deleterious results that necessarily follow from such an added irritation. This point being conceded, some real benefit can be extended to people suffering from these diseases, by removing or replacing a very dry atmosphere with one containing an optimum of moisture.

As a matter of fact most people have witnessed the use of a bronchitis kettle for patients suffering from acute bronchitis—this homely but efficient device supplying a quantity of water vapour to the atmosphere which is to be breathed by the patient; the immediate relief in these cases is most striking.

Reverting to the first series, viz. the effects produced by a dry atmosphere on healthy lungs and bronchi, no such absolute or incontrovertible proofs can be brought forward as in the second series, but some strong points may be brought out by analogy.

It is now-a-days quite an accepted fact that where you have the mucous membranes lining the lungs and bronchi in a congested or irritated state, the conditions are then favourable for the "grafting on" of some disease, e.g., most marked of all, Tuberculosis.

If other mechanical irritations besides that produced by dry air can be the starting point or predispositions of some disease, why not that produced by dry air?

This argument is brought forward only as a strong probability, but it must gain in strength when the results, to be narrated below, of the action of air which is too dry on the healthy membranes lining the nose and throat, are carefully considered and weighed.

CASES IN POINT:

(I) A. B., arrived in Canada late in the year, and during the winter suffered greatly from congestion of the nose and throat, and to a less extent of the bronchial passages.

The air of the rooms which he occupied was suspected, but chemical analysis showed its composition to be fairly good. The CO_2 = .07 per cent; the air in the rooms where he spent most of the day showed CO_2 = .08 to .09 per cent, but the symptoms of congestion never developed there, consequently vitiation by excess of CO_2 could not account for the trouble.

On testing the relative humidity it was found to be very low, on an average 40 to 50 per cent.

The symptoms of congestion always disappeared rapidly when the individual went outdoors. Keeping the windows open regularly prevented the congestion.

(2) Other cases of a like nature were found:

"Stiffness of the nose and throat" was an expression commonly applied. "A feeling of tension between the eyes" (evidently congestion of the frontal sinus), also "irritation spreading through to the ears," were descriptions given by not a few.

In several of these instances air in their houses was examined: The CO_2 was never found to be much, if at all, above the normal .06 per cent—the other chemical constituents normal—but in all cases the Relative Humidity was low, never exceeding 50 per cent.,—generally about 40 per cent.—lowest record, 35.8 per cent.

(3) The case of a family in which there were five children, three boys and two girls, ranging from three to ten years. They had returned to town after a stay in the country during the summer. The boys quickly began to lose tone as the winter came on. They all exhibited congestion of the nose and throat of a chronic nature. The two little girls continued well. It was found that the girls slept in a room where the windows were kept open night and day, but not so the boys.

Chemical examination in the different rooms showed no material increase of the CO_2 , or the presence of other deleterious constituents. The relative humidity was about 40 percent. In the boys' room a minimum of 38 per cent was obtained. In the girls' room the relative humidity averaged 50 to 55 per cent.

Fresh air was admitted by open windows to the boys' rooms and they showed signs of improvement immediately and are now quite well.

Dr. Birkett, of Montreal, a specialist on the nose and throat fully bears out the arguments brought forward above, for in his extensive

practice he has noted many cases of a like nature to the ones just detailed. He also has tried increasing the moisture in the atmosphere with exceedingly good results.

Having established the fact of the deleterious action of an atmosphere containing too little moisture upon the human organism, your attention is invited to the appended tables wherein are shown a series of average observations.

In speaking of the moisture, or more correctly the amount of moisture, contained in the atmosphere, it ought to be noted that too dry air is unpleasant to breathe, saturated air when warm is unbearable, e.g. 80°F.—the most comfortable is when the air contains about 70-75 per cent of moisture necessary to saturate it.

	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
Average rel. humidity.....	87.8	86.7	79.2	78.1	79.2	80.3
Average temp. (indoor).....	64°	64°	65°	66°	66°	65°
Average rel. humidity (indoor)—windows closed.....	58	53	46	41	42	45
Average rel. humidity (indoor)—windows open.....	66	61	58	57	57	58

	N	O	CO ₂
Average composition outside air in percentage.....	79	20.96	.04
Average composition indoor air per cent.....	79	20.94	.06

In these tables will be noted first the constancy of the indoor temperature — this is as it should be in a private house, such as the one in which all these observations were made. The outdoor temperature is not recorded, but during the months of January, February and part of March, it is often 0°F. or well below, on the average.

Knowing then that if we warm a given quantity of air completely saturated with moisture at the initial temperature it no longer remains saturated, we can readily see what an enormous difference in the relative humidity is entailed by heating the outside air registering 0°F., or below, to a temperature of 64°F.

The effects of allowing some of the unheated outside air to enter the house, are plainly visible when comparing the series of relative

humidity indoors with the windows closed and open respectively.

During the months of October and November the marked deviation of the records is not so noticeable as in January, February and March. This is owing to the fact that during October and November the furnaces are not as yet in full swing, and consequently a great deal of unaltered outside air gains admission to the house.

In these tables the relative humidity has always been calculated by means of the wet and dry bulb hygrometer, which we now proceed to show yields results very much too high for low relative humidities.

WET AND DRY BULB HYGROMETER.

The instrument most generally in use for the determination of relative humidity is the wet and dry bulb hygrometer, or psychrometer. This type has the advantage of giving continuous readings, and its use seems to have been first proposed by Sir John Leslie.

It is of great importance to have an instrument for meteorological work which gives at any time, without manipulation a reading of the humidity. There are two forms in which this instrument is met with; the usual one consists of two stationary thermometers, one of which gives the air temperature and the other the temperature of a piece of absorbent material from which water is continually evaporating. The second form is the instrument provided with a handle so as to rotate the two thermometers rapidly and cause the maximum evaporation from the moistened wick over the wet bulb.

So many complex circumstances have effect on the indications of the instrument that it seems impossible to deduce any satisfactory theoretical formula for it. The well-known formulas of Apjohn and of August are not reliable over an extended range.

The elaborate tables compiled by Glaisher, which are universally used, were constructed from a large number of simultaneous readings with the wet and dry bulb and the Daniell's hygrometer. It is stated that these were made at the Greenwich Observatory and in India and at Toronto.

During the progress of our work a grave doubt was raised in our minds as to the reliability of the instrument for air of very low moisture content. Thus the comparison which we give of the humidity in an average house in winter with the direct determination by the absorption method, was far from satisfactory. This was shown also on two or three occasions in the Macdonald Physics Building by comparing the dew point obtained on the Regnault hygrometer with the dew point deduced from a wet and dry bulb hygrometer.

On arriving in the laboratory on February 3rd, after a clear, cold night, a small cheap indicating hygrometer of the spiral type, was observed to be reading nearly zero humidity. This instrument had been carefully calibrated over its entire scale some time previous and had been then set correctly. It may be stated that this instrument was selected from a lot of half a dozen sent to us on trial, all of which were found entirely wrong, not only in reading but what was worse in range. The reading may always be corrected easily, but the range is a much more serious matter to adjust without injury to the delicate spiral.

It was decided to check this low reading by means of a reliable instrument. The Regnault hygrometer was accordingly used and a telescope provided for observing the appearance and disappearance of the film of moisture on the silver bulb containing the ether. The dew point was found to lie between 10.5° F. and 11.0° F., and was clearly defined between these limits. The maximum and minimum air temperature was given for that date as $+11.5^{\circ}$ F., and -13.8° F. The relative humidity calculated from the dew point was only 9 per cent, and showed that the dryness of the air was very great indeed, and that the spiral hygrometer was nearly correct.

The four following days were cold and clear, as shown by the following temperatures in Fahrenheit degrees:

February 4th,	Maximum 33.1,	Minimum 11.9
“ 5th,	“ 30.3,	“ -8.5
“ 6th,	“ -2.9,	“ -17.5
“ 7th,	“ +5.1	“ -10.5

Everything was conducing to excessive dryness as was shown on the morning of the 7th in the laboratory when a comparison was made of the various hygrometers we possessed.

The Regnault hygrometer gave a dew point of 3.75° F. (limits of appearance and disappearance of mist—hoar frost— 3.5° and 4° F.), which is above the mean air temperature. This shows that the air was dryer than the materials in the laboratory, some moisture being imparted to the air on account of this.

The relative humidity calculated from this observation is 6.25 per cent. The spiral hygrometer showed 5 per cent humidity, but the indications of the wet and dry bulb hygrometer of the stationary type were interesting. The dry bulb registered 69° F., and the wet bulb 57° F., showing a difference of 12° F., or 6.4° C. This gives a relative humidity of 45 per cent; this was at the same time as the other hygrometers gave 5 and 6.25 per cent respectively.

An effort was made to increase evaporation from the wet bulb in order to increase the observed difference. The wick was lengthened and more air circulated about the bulb. The readings were then observed to be 68°F. and 52°F., showing a difference of 16°F. or 8.88°C.; no greater difference could be obtained.

This gives a relative humidity of 26 per cent., which was a little nearer the truth. The observed difference between the two thermometers should have been well over 20°F. to have given the correct result.

It is possible that a revolving hygrometer would have given better results, and one was procured, but not in time for a test on this date. Later in the season when the humidity was from 10 to 15 per cent one of these instruments was tried but with little success. Possibly the form we procured was not sufficiently accurate.

It is evident from our comparisons that the wet and dry bulb instrument is not suitable for the measurement of relative humidity beyond a fairly large percentage, probably on account of the conduction of heat down the stem of the thermometer offsetting the cooling due to evaporation.

How far the instrument is suitable for outdoor readings, when the air is very cold, we are not yet in a position to state, but we are inclined to think it does not give very satisfactory results. For small differences showing high relative humidity it is satisfactory, and it is from such readings that Glaisher's tables were doubtless compiled.

We include a test here to show that satisfactory results may be obtained under these conditions. The date of test was May 18th, 1906 in the Physics Laboratory. The Regnault hygrometer gave a dew point of 18.85°C. with the air temperature 21.7°C., which gives a relative humidity of 82 per cent. Simultaneous readings with the wet and dry bulb gave:

for the dry bulb,	21.7°C.
“ “ wet “	19.6°C.
Difference,	2.1°C.

This gives a relative humidity of 82 per cent, and a dew point of 18.8°C., which is identical with the Regnault instrument.

We think then that for high relative humidities the wet and dry bulb hygrometer yields correct values, with moderately high temperatures, but that for low humidities the instrument is entirely misleading.

In view of these discrepancies further tests were carried out in the Hygiene Department, which tests consisted in comparisons between the

results of the wet and dry bulb hygrometers and the exact chemical estimations of the water vapour in the atmosphere at the same time:

RELATIVE HUMIDITIES:

Simultaneous Observations by the Two Methods.

No.	WET AND DRY BULB	CHEMICAL ANALYSIS
1	78 per cent.	70.5 per cent.
2	71 "	71 "
3	53.47 "	34.7 "
4	55.1 "	35 "
5	52.2 "	36.57 "
6	52.2 "	36.5 "
7	54 "	36 "
8	53 "	28.5 "
9	38.8 "	30.5 "
10	39 "	29 "

The first six observations were taken on different days at very irregular intervals extending over six weeks. The wet and dry bulb thermometers were suspended in the middle of the laboratory where only a slight current of air obtained. The disparity in the results here are extremely striking and from the few figures obtained one cannot deduce any corrections applicable to the wet and dry bulb instruments. Where the humidity is about 70 to 80 per cent the results apparently are not very far from the accurate condition of the humidity, but with a fairly still atmosphere and a low percentage of moisture the results of the wet and dry bulb instrument varied tremendously, being out on an average 20 per cent.

The last four observations, namely, Nos. 7, 8, 9, and 10, are interesting being all taken on the same day, 7 and 8 taken in the morning at a two-hour interval, the wet and dry bulb instrument being placed under still conditions as above mentioned. Here again the discrepancy is about 20 per cent as before. In Nos. 9 and 10 observations were taken in a very marked draught of air, the instruments being placed in the draughts from three large open windows and one would not be far short of the mark by saying that the conditions were almost identical with

those in the open. The evaporation from the wet bulb had thus free play and would be practically at its maximum.

The relative humidities under these conditions correspond fairly closely with those obtained by exact chemical analysis. It is of course as one would expect that where full play is given to the evaporation the records ought to be nearer the truth than when the wet and dry bulb instruments are placed in a still atmosphere and the rate of evaporation is interfered with to a large extent. But one can easily see from the last two observations that no figures of correction are possible because the rate of evaporation depending so exactly upon the movement of the air, any interference with the latter would necessarily throw the results a great way out from the truth.

We bring forward these tests in connection with our discussion of deficient humidity because the wet and dry bulb hygrometer is almost the only instrument used for testing the relative humidity by householders. Many observers have found the dryness excessive by using this instrument, but it will be seen that the actual state of affairs is probably much worse than has been imagined.

Methods have been devised for supplying moisture to the air of houses and buildings, but a few figures to show the amount of moisture required to bring the air up to a normal healthy humidity will be found to be somewhat discouraging. Thus in an ordinary sized dwelling house when due allowance is made for the amount of air required for each person per day something like 33 gallons of water must be evaporated daily to keep the air at a relative humidity of 75 per cent. Other difficulties arise when this is accomplished. Rapid condensation takes place on the windows when the air temperature outside is very low. Experience has shown that this commences at a humidity of about 40 per cent. We are inclined to think that much could be accomplished by maintaining the humidity even at this latter figure, and that the question should be earnestly considered in order to improve the general health of the large proportion of people who spend the greater part of their life in artificially heated buildings.

ROYAL SOCIETY OF CANADA

TRANSACTIONS

SECTION IV

GEOLOGICAL AND BIOLOGICAL SCIENCES

PAPERS FOR 1906

I.—*The Gypsum Deposits of New Brunswick.*

By L. W. BAILEY, LL.D.

(Read May 22nd, 1906.)

A very large increase in the production of gypsum has occurred during the last few years, as indicated by the fact that while in the year 1890 the total quantity produced in the United States was 182,995 short tons, with a value, as crude gypsum, of \$19,148, and, as manufactured, of \$574,523, in 1903 the total quantity was 73,912 short tons, with a value, for crude plaster, of \$87,608, and, for the manufactured product, of \$3,792,943, an increase largely due to the much wider range of its applications. Similarly, from New Brunswick alone the shipment to the United States, which in 1890 amounted to 25,672 tons, had, in 1897, risen to 59,334 tons, and, in 1905, to 125,402 tons.

Coincident with this increase in the employment of gypsum much more attention has been paid to the conditions of its occurrence, and to the numerous questions, of scientific interest, which a study of such occurrence suggests. As the New Brunswick deposits present many features of interest, and in some instances exceptional opportunities for investigation, it has been thought by the writer that a summary of the facts which have come under his observation would not be without value.

The gypsum deposits of New Brunswick, like those of Nova Scotia, are, without exception, confined to the Lower Carboniferous system, in this respect resembling those of Virginia. They are also confined to the summit of that formation, being in many instances immediately followed by the basal beds of the Millstone grit. Finally, they show in most instances little evidence of disturbance, being either in very low undulations or quite horizontal. Regarded with reference to the present sea level the most important beds are within two hundred feet of the latter, but some extensive deposits are found at elevations equal to at least twice that amount. In northern New Brunswick the most important deposits are those of the Tobique valley, in Victoria county. As exposed in and near the village of Plaster Rock, to which a branch of the Canadian Pacific Railway has been extended for the more ready removal and marketing of the material, the gypsum forms vertical bluffs about 130 feet high, consisting of numerous alternating bands of gray, greenish and reddish colours and granular texture, traversed here and there by seams of white fibrous gypsum or satin spar. Owing to the want of exposures the horizontal extension of the deposit is not

known, but is believed to include several square miles. The gypsum rests on limestones which, as far as known, are destitute of animal fossils and remarkable for their open, stalactitic and coralloidal character, as though the result of chemical deposition. Calcified trunks of trees of large size and very perfect preservation are sometimes met with.

Considering the elevation of these beds (about 300 feet), together with their horizontal attitude, the conclusion is suggested that at the time of the deposition of the gypsums all portions of northern New Brunswick having a less elevation than the amount stated must have been in a state of submergence.

In central New Brunswick the red marly and sandy beds of the Lower Carboniferous system are to some extent gypsiferous, but no deposits of any extent occur, this formation being mostly covered and concealed by the gray rocks of the coal formation.

In southern New Brunswick the localities are more numerous, being found in many parts of King's, Albert and Westmorland counties. In King's they occur in the vicinity of Sussex and in the parish of Hammond; in Albert about Hillsboro, Hopewell, Demoiselle creek, and Riverside; and in Westmorland on the north branch of the Petitcodiac river and at Cape Meranguin. Of these by far the most important are those of Hillsboro, to which special attention may now be directed.

The Hillsborough plaster-beds, as now exposed, lie along the western and southern sides of a somewhat funnel-like depression, opening eastwardly towards the Petitcodiac river, where is situated the village above named, together with the plaster mills and shipping wharves. The height of the gypsum beds above the sea level varies from 30 or less to 285 feet, while the height of the western side of the basin, along the base of which are the principal quarries, is about 400 feet. The depression itself presents considerable diversity of surface, its eastern portion being occupied by marsh lands but little above tide-level, while the remainder shows as a whole a gradual rise, broken, however by numerous ridges and valleys, the result mainly of stream erosion, but in part also consequent upon differential movements. Within the area actually underlaid by gypsum the irregularity becomes extreme, the occurrence of steep bluffs of gypsum (Plate I), of circular steep-walled depressions once occupied by the latter and often several rods in diameter, or of tracts honeycombed with sink holes, being the most noticeable features. These are sometimes so crowdedly grouped and so narrowly separated that passage across the areas occupied by them is both difficult and dangerous (see Plate 4, Fig. I). In addition to the surface drainage an underground drainage is known to exist, and caves

of considerable dimensions (Plate II), some of them occupied at their mouths by never melting snow, occur. Some noticeable hills of till are found, but the district is remarkably free from the presence of large erratics. The soil, as a rule, is very fertile, supporting a varied and luxuriant forest growth.

As bearing upon their probable origin and history the situation and topography of the plaster beds of Hillsborough are not without significance. These are indicated in the accompanying sketch map, wherein it will be seen that they are found not far from the eastern end of an elevated tract of very ancient rocks extending eastward from near the city of St John and parallel to the Bay of Fundy. It is probable that during the Lower Carboniferous period this ridge was wholly submerged, as conglomerates and limestones of the formation named constitute the summit of Shepody Mountain, now about 1,000 feet above sea-level.

The geological succession in the immediate vicinity of Hillsborough is, in ascending order, as follows:—

(1) *Reddish brown and chocolate, sometimes gray, calcareous conglomerates and sandstones*, with clayey and marly beds, the conglomerates containing pebbles of granite, syenite, slate and other metamorphic rocks, the whole well stratified and indicative of rapid deposition under the influence of strong currents in shallow waters. In places these rocks show the presence of albertite in small veins or scattered particles. They have an exposed thickness of 60 or 70 feet, which, however, is but a small part of their total thickness as seen elsewhere.

(2) *Gray bituminous limestone*, thin bedded or flaggy, also holding small veins of albertite. The limestones are essentially non-fossiliferous, though upon some surfaces are to be seen small cylinders apparently of organic origin, of which the true nature cannot readily be made out. The nature of the beds indicates their deposition or precipitation in quiet waters too shallow or too impure to favour the development of organic life. The thickness of the limestones is about 30 feet.

(3) *Gypsum and anhydrite*. These deposits follow immediately upon the limestones, as observed at many points. They are also frequently well stratified with an aggregate thickness of about 200 feet (see Plate III). They are in places quite compact, in others much shattered, and are usually extensively divided by vertical joint-planes, made more evident at the surface by the development, through solution, of sharp pinnacles or castellated forms, or, on faces of excavations, by steeply inclined or vertical clefts, widened by water and subsequently

filled with deposits of red clay (see Plate III, Fig 3). The varying character and origin of these deposits are discussed below.

(4) *Red conglomerates, with greenish and reddish marls.* The thickness of these beds is not definitely known, but is probably not over 100 feet.

(5) *Gray sandstones*, with numerous white quartz pebbles. These are the characteristic rocks of the Millstone-grit formation — marking a transition to the brackish and fresh-water deposits of the Coal period. They are found only on the border of the basin and on the summits of the higher hills.

In addition to the above there are heavy beds of red clay, usually resting directly upon the gypsum, with a thickness varying from a few yards to thirty feet or more (Plate V). This clay is very fine and very tenacious. Its colour, due to disseminated anhydrous peroxide of iron, as well as its character, indicate a very thorough oxidation of the materials composing it, with the absence of vegetable matter. Similar clays fill the vertical or oblique fissures, sometimes eight or ten feet wide and twenty or more feet deep, dividing the rock faces of gypsum or filling irregular cavities in the latter. Occasionally they are disposed as more or less horizontal layers between successive deposits of gypsum, but these intermediate bands are more commonly of a gritty nature. Their relation to the coloration of the gypsum is very obvious.

Confining our attention to the plaster beds we find them to consist, in very variable proportions, of gypsum and anhydrite, their irregular association and the fact that the latter is practically valueless determining the most important problems in the economical working of the quarries. For many years it was supposed that the workable gypsum beds, especially at the Steves quarry, were underlaid by deposits which were mainly anhydrite or hard plaster, but this has been recently disproved, and it would seem that no definite rule can be ascertained governing the mode of occurrence of the two rocks as regards either horizontal or vertical distribution. In places they are mingled to form a complex network, while in others masses of pure gypsum on the one hand, or of anhydrite on the other, may be found with a thickness, in either case, of thirty feet or more.

The gypsum itself presents much variety of colour and texture. As to the latter much of the rock is either amorphous or cryptocrystalline; less frequently it is granular or saccharoidal; and still less frequently takes the form of selenite. Crystals of the latter mineral are sometimes found irregularly distributed in massive alabaster, but are usually in groups and not infrequently arranged along lines of

bedding or lamination. They seldom exceed an inch in diameter. No fibrous gypsum or satin spar occurs in the massive plaster rock, but veins of this character, usually less than an inch in width, are found in the associated red sandy and clayey beds, and are evidently of later origin. In colour the rock varies from snowy whiteness to shades of gray, blue and salmon red, being sometimes mottled, selenite crystals when they occur being usually darker than the rock in which they are imbedded. The red colour is most pronounced in the vicinity of cracks or layers containing red clay, though sometimes diffused through considerable masses.

Chemical analysis of the first grades of the gypsum rock show it to contain 99.88 per cent of hydrated sulphate of lime, with only traces of iron, silica and magnesia, but in inferior grades there may be found carbonate as well as sulphate of lime, with both silica and iron, though in inconsiderable amounts.

An important feature in any discussion of the gypsum deposits of Albert county is that of their arrangement, to which must be added the evidences which they afford of deformation. In many parts of the quarries the indications of stratification or of lamination are very marked, as illustrated in the accompanying plate (see Plate III), and are sometimes made more evident by bands of small selenite crystals arranged on either side of a bedding plane, or, in some instances, with this plane bisecting individual crystals. The planes of lamination are at times very regular, at others wavy or corrugated, and, though in general not as a whole far from horizontal, occasionally exhibiting inclination of 30° or more. The corrugations referred to and local crumplings may in part be due to pressure resulting from hydration, or from removal of support through the effects of solution, but the study of the district as a whole, and especially of the relations of the gypsum beds to the underlying limestones, show that both of these rocks have been subjected to deformation, determining a general synclinal structure, the broad and open basin thus produced being partly divided into smaller basins by low anticlinal domes. From the study of these relations (see section) we are also led to the inference that the original thickness of the plaster beds must have been at least 300 feet, as also that over considerable areas this had been removed by denudation prior to the commencement of quarrying operations. The effects of the solvent action of waters are everywhere to be seen in the broken, castellated or turreted aspect of the gypsum bluffs, in the abundance of pot-holes, often, as already noted, crowdedly grouped, and in the evidences of underground drainage. In addition to evidences of plication the rocks show also the effects of lateral pressure in the pro-

duction of joints as well, as seen in Plate III, these joint planes determining the forms assumed in weathering as well as the vertical red clay partings by which the beds of plaster are often divided.

To the features above referred to must be added the fact that at a number of points in and about the quarries, the plaster rock exhibits a markedly concretionary structure, the concretions varying in size from a few inches up to two feet or more, and looking, on the face of exposed bluffs, like the ends of barrels piled one upon another. (See Plate IV, Fig 2).

We may now pass on to consider the possible origin of the gypsum deposits (including in this connection both true gypsum and anhydrite) in relation to theoretical views as to the conditions of such origin, and as indicated by the facts already cited.

(1) *Derivation from limestone through action of free sulphuric acid.* This mode of formation, in its application to Acadia, was strongly advocated by the late Sir William Dawson. It supposes sulphuric acid to have been formed either as an indirect product of volcanic action, through oxidation of sulphur and sulphurous vapours, or else through the similar oxidation of hydrogen sulphide or metallic sulphides, and, reaching the sea in streams, to have discharged carbonic acid from limestones pre-existing there, with formation of calcic sulphate either as gypsum or anhydrite.

In favour of this view we have the fact that the gypsums of Albert county are directly and invariably underlaid by limestones, while a considerable percentage of calcic carbonate is to be found in deposits of otherwise pure gypsum. Volcanic activity is also known to have been a marked feature of the Lower Carboniferous age in Acadia, while gypsum deposits, undoubtedly thus formed, have been observed in various parts of the world. On the other hand, so far as Albert county, New Brunswick, is concerned, no rocks of volcanic origin are found in the vicinity of the plaster beds; pyrites and other sulphides are not noticeably abundant in the rocks of the district; no sulphur springs are found; and the existence of acid springs at the time of the formation of the gypsum is an assumption wholly without direct evidence in its support. The view, though applicable in some instances and upon a small scale, has been generally abandoned in relation to the larger deposits of gypsum rock as being less in accordance with observation and experiment than other views more recently advanced.

(2) A second supposition is that the plaster deposits owe their origin to the *mutual reaction of natural sulphates*, such as those of iron, copper and magnesia, with carbonate of lime; but there is nothing in connection with the Hillsborough deposits to give it support, and

the view is open to the same objections as in the case of the theory first referred to.

Both of the above views fail to take any account of the coexistence and intimate association of gypsum and anhydrite.

(3) *Derivation by precipitation from salt water in shallow basins.*

This is the view now generally taken as regards the original deposits of which the plaster beds are the present representatives, and finds strong support in the observations made in connection with the residues of such inland seas as the Great Salt Lake of Utah, and the more ancient and more extensive basins known as Lakes Bonneville and Lahontan. It is not, however, believed that the deposits in question, as now found, are necessarily in the same condition as when first deposited. For, as has been stated, they consist in part of gypsum and in part of anhydrite, and questions naturally arise as to the relations of these two. Were they deposited coincidently or has the one been derived from the other? In the latter case, which was the antecedent rock? and what conditions have determined either their separate precipitation or the conversion of the one into the other?

As favouring the general view that the Acadian deposits of gypsum were produced by precipitation from sea-water, a number of facts may be noticed.

First, the Lower Carboniferous rocks, of which the gypsiferous strata form the upper member, show throughout the district abundant evidences of marine origin, the most conspicuous being their prominently red colour, due to the absence of vegetable matter, the occurrence of salines, the paucity of vegetable remains and the frequent occurrence of limestones carrying corals, crinoids and brachiopods. The distribution of these rocks, together with their relations to the present sea level, also indicate that, as regards portions at least of the era, the Provinces of New Brunswick and Nova Scotia were largely if not wholly submerged, deposits of this age in the former province being found upon the summit of Shepody Mountain (900 feet high, and but little removed from the plaster quarries at Hillsboro), at Henry Lake on the summit ridge of the Quaco Hills (800? feet), and on the Tobique river, the beds in each case being but little removed from horizontality. Upon the other hand, the character of the beds, containing but little limestone, but abounding in coarse clastic deposits such as sandstones and pebble beds, indicates that with general subsidence, to a depth probably of several thousands of feet, the waters remained shallow and subject to frequent changes both as to distribution and as to depth. Shifting sand bars or sea walls would from time to time enclose basins or lagoons, wherein, as a consequence of isolation, together with ex-

posure to the effects of a warm and arid climate, evaporation might at intervals go so far as to lead to the deposition of the contained salts. The waters of these lagoons, when highly concentrated or unduly heated, would not be favourable to the presence of organic life, and the absence of fossils in the limestones beneath the gypsums may be due to this cause, as may also the vast numbers of fossil fishes found in the shales of the old Albert mines only a few miles distant from Hillsboro, and whose sudden destruction may have been due to some such cause. Under such conditions the salts of lime, as being the least soluble, would, as in the artificial evaporation of brines, be the first to separate, and, as in such artificial evaporation of water containing calcic sulphate this invariably separates as hydrated sulphate or gypsum, we may suppose that the same was the case with the formation of rock-plaster, the primary condition of the latter being therefore that of true gypsum. This view is that taken by Prof. W. O. Crosby, of the Massachusetts Institute of Technology, who has further expressed his belief that, the rock having been first deposited as gypsum, the burial of this beneath a sufficient mass of superincumbent strata would determine the conditions of low temperature thermo-metamorphism, dehydrating the gypsum as in the production of plaster of Paris, and giving origin to anhydrite. Finally, as is well known, the latter mineral, being, like other anhydrides, an unstable compound, tends to be reconverted, through atmospheric agencies, to the condition of gypsum, a slow process which is still in operation. Thus, according to this view, gypsum, as we now have it, is a hydrated anhydrite, the latter being derived from previously existing and original deposits of gypsum.

In this connection it may be observed that Van Hise, in his great monograph on Metamorphism (page 357), says: "The main source of anhydrite is by the alteration of gypsum," and again, that "the chief alteration of anhydrite is to gypsum, with an increase of volume of 60 per cent," citing as an example the anhydrite deposit of Bex, Switzerland, where the transformation from anhydrite to gypsum has taken place completely to a depth of from 18 to 30 metres, the materials below this depth being anhydrite.

On the other hand, there are those who maintain that both gypsum and anhydrite may be deposited from the same solution, the production of the one or the other depending upon the conditions prevailing at the time, these conditions including temperature, depth of water, degree of concentration, and especially the presence of other salts. Thus, Adams observes, "Anhydrite may be formed from gypsum solutions at various temperatures when the solutions contain other salts in sufficient quantities. For example, it has been found that in the presence of a

saturated solution of common salt this change (from gypsum to anhydrite) takes place at 30° C., which is a temperature reached on a summer day. This fact satisfactorily accounts for the formation of anhydrite in nature from concentrated sea water or lake brines." Van't Hoff, also, in his work on the German salt deposits, has made it very probable that the presence of saline matter has a marked influence upon the form in which the lime sulphate is deposited. Geikie, in his Text-Book of Geology, page 115, in alluding to various possible methods of the formation of gypsum, says, "It may be produced as a chemical precipitate from solution in water, as when sea water is evaporated; also through the hydration of anhydrite"; adding that "it is in the first of these ways that the thick beds of gypsum associated with rock salt in many geological formations have been formed."

We may now briefly consider the facts presented by the gypsum deposits of New Brunswick in the light of the theories above noted.

It has already been shown that the geographical and physical conditions prevailing in this part of America at the time of the Lower Carboniferous formation were favourable for the production of evaporating basins or lagoons, similar to those which are believed to have characterized portions of the State of New York during the Salina period; and from the occasional occurrence of corals in the limestones, and of Tree Ferns (*megaphyta*) in certain beds of the overlying Millstone grit, we may infer that the temperature conditions were equally favourable. Supposing, however, the whole of the original deposition to have been in the form of gypsum and that this was dehydrated as the result of deep burial and consequent thermo-metamorphism, we have to enquire as to the possible thickness of overlying sediments necessary to determine this result. These would necessarily consist largely of the rocks of the coal-formation. Now these, so far as the beds of the Millstone grit and the Middle Carboniferous era are concerned, are well known to have, over the greater part of New Brunswick a very insignificant thickness as compared with the same rocks in Nova Scotia, reaching a maximum, and that only in one locality, of a little over 1,000 feet. The thickness of the upper or Permo-Carboniferous, as found in Westmorland county, has also been estimated (by Ells) as about 1,000 feet, and this is not found in any part of Albert county. It may once have been there, as also later beds of Mesozoic or even Cenozoic origin, and have been removed by erosion; but making all reasonable allowance for this, it seems improbable that more than 3,000 feet of sediments ever lay above the gypsum deposits, and it is a question whether this would have led to any appreciable rise of temperature in the beds thus buried. On the other hand, it is known that the temperature at which

the alteration under consideration may take place is comparatively low; it is lowered by pressure, and possibly in the lengthy processes of nature no change may be needed at all, as is known to be the case for ferric, aluminic, silicic and other hydrates.

As to the reconversion of anhydrite into gypsum, by surface action, the quarries at Hillsborough, in common with those of Windsor, Nova Scotia, show a general tendency towards the occurrence of anhydrite rather than gypsum with increase of depth, and Prof. Crosby has informed me that at the locality last named every stage of the transition may be traced. The only direct indications, however, of such a change, as seen by the writer in the Hillsborough quarries, are to be found in the concretions alluded to in the description of the varying aspects of the plaster rocks, and of which the interior is invariably anhydrite while the exterior is soft plaster or gypsum. Otherwise the two minerals are in this locality mingled in such a way as to defy anticipation, though even this may be favourable rather than the reverse to the view that the one has been derived from the other. The matter is one of great practical importance, as the recognition of any principle governing the occurrence of the hard and useless anhydrite as compared with the merchantable gypsum would mean a very large saving in the cost of production.

The occurrence of albertite veins completely enclosed in pure white and massive alabaster is an interesting feature of the deposits at Hillsborough, and has been the subject of discussion by the writer in Vol VII (second series) of the Transactions of this Society. As the same mineral penetrates the overlying beds of the Millstone grit, it could hardly have been contemporary with the enclosing gypsum, and its presence in the latter, wholly disconnected with any outside source of similar material, is not easy to understand.

Another noticeable feature of the Hillsborough deposits is that of the comparative paucity of selenite crystals. These are, indeed, numerous in some parts of the quarries, but they are quite local in their distribution and of small dimensions, the greater part of the rock being a cryptocrystalline or amorphous alabaster. Where most abundant they also exhibit a decided tendency towards aggregation along lines of bedding or lamination, which would seem to indicate either that they represent surfaces of original deposit, affording ample room for coarse crystallization, or that they have been subsequently formed through the agency of solutions traversing the rock along the lines referred to. The selenite crystals are also usually much darker than the enclosing alabaster, being sometimes almost black, a result probably due to disseminated carbon. Groups of selenite crystals have been found cemented

by albertite. That the production of selenite crystals has continued since the time of the deposition of the massive rock is indicated by the fact that red sandstones, later in origin than the gypsum proper, are traversed by numerous narrow veins of satin spar.

Comparing other deposits of the province with those of Hillsborough, it may be noted that those of the Tobique valley, in Victoria county, are remarkable as being not only much less pure, but also as being distinctly crystalline throughout, with traversing veins of fibrous gypsum or satin spar, probably of later origin. At this point also the limestones, instead of being flaggy and destitute of fossils, as at Hillsborough, are coarsely tufaceous and stalagmitic, as though of crenitic origin, at the same time enclosing somewhat numerous fragments and trunks of calcified trees. In the former feature they suggest comparison with the tufaceous deposits found around the shores of the Great Salt Lake, in Utah, and which have been regarded as due to the action of saline water upon brooks charged with calcic carbonate, leading to the rapid and complete precipitation of the latter.

Near Sussex, in King's county, groups of selenite crystals, *with the crystals filled with grains of sand*, are found at the bottom of springs, and appear to be still in process of formation. Here also the gypsum is accompanied by brine springs, which are wanting at Hillsborough.

On the Petitcodiac river, a few miles from Salisbury, in Westmorland county, a considerable mass of gypsum is wholly in the condition of selenite crystals, mostly of small size, or granular, but traversed by veins in which large plates of the crystalline variety are associated in a most intricate fashion.

Upon the peninsula terminating in Cape Meranguin, in Westmorland county, about fifteen miles from Hillsborough, but separated by the waters of the Petitcodiac river and Shepody Bay, the shore shows an interesting section in which beds of finely granular gray and white gypsum, more or less spotted with selenite crystals, contain masses of anhydrite in the form of irregular wedge-like or lenticular layers, besides bands of brownish red rubbly sandstone, enclosing masses of gypsum, the whole resting upon limestones containing fossil shells. The selenite crystals are of a deep red colour.

At Demoiselle Creek, about six miles from Hillsborough, plaster beds which may be continuous or nearly so with those of the latter locality, though now separated at the surface by a high ridge of conglomerate and gray sandstone (Millstone grit), contain a stratum, from eight to ten feet thick, in which the rock is a coarse breccia, filled with angular fragments of gypsum of all sizes, and which indicate that the conditions of quiescence under which the ordinary plaster rocks

were accumulated, were occasionally interrupted by more sudden changes, involving disruption of the beds and more rapid sedimentation.

At Martin's Head, upon the coast of St. John county, thirty miles southwest of Hillsborough, gypsum beds of limited extent and less pure than those of the latter locality, but still merchantable, occur, and are remarkable as forming the basal rocks of a synclinal basin, enclosed between parallel bands of old Pre-Cambrian schists, and overlaid directly by brown shales, gray calcareous sandstones holding nodules of gypsum, and yellowish gray very ochreous sandstones, all dipping at an angle of 45° . The marly beds have veins of fibrous gypsum, and in places completely enclose, within greatly contorted laminae, irregular masses of gypsum from two to four feet thick.

From the distribution of the gypsiferous strata around the Bay of Fundy trough, at Martin's Head, Riverside, Demoiselle Creek, Hillsborough, Cape Demoiselle, Windsor, etc., it would follow that the conditions originating such deposits, as discussed above, must have been very general in this district near the close of the Lower Carboniferous era. It is also quite possible that these conditions were not quite the same at all points and that among the beds described several of the modes of deposition or origination discussed above may find illustration.



VIEW IN GYPSUM QUARRY—HILLSBOROUGH, N.B.

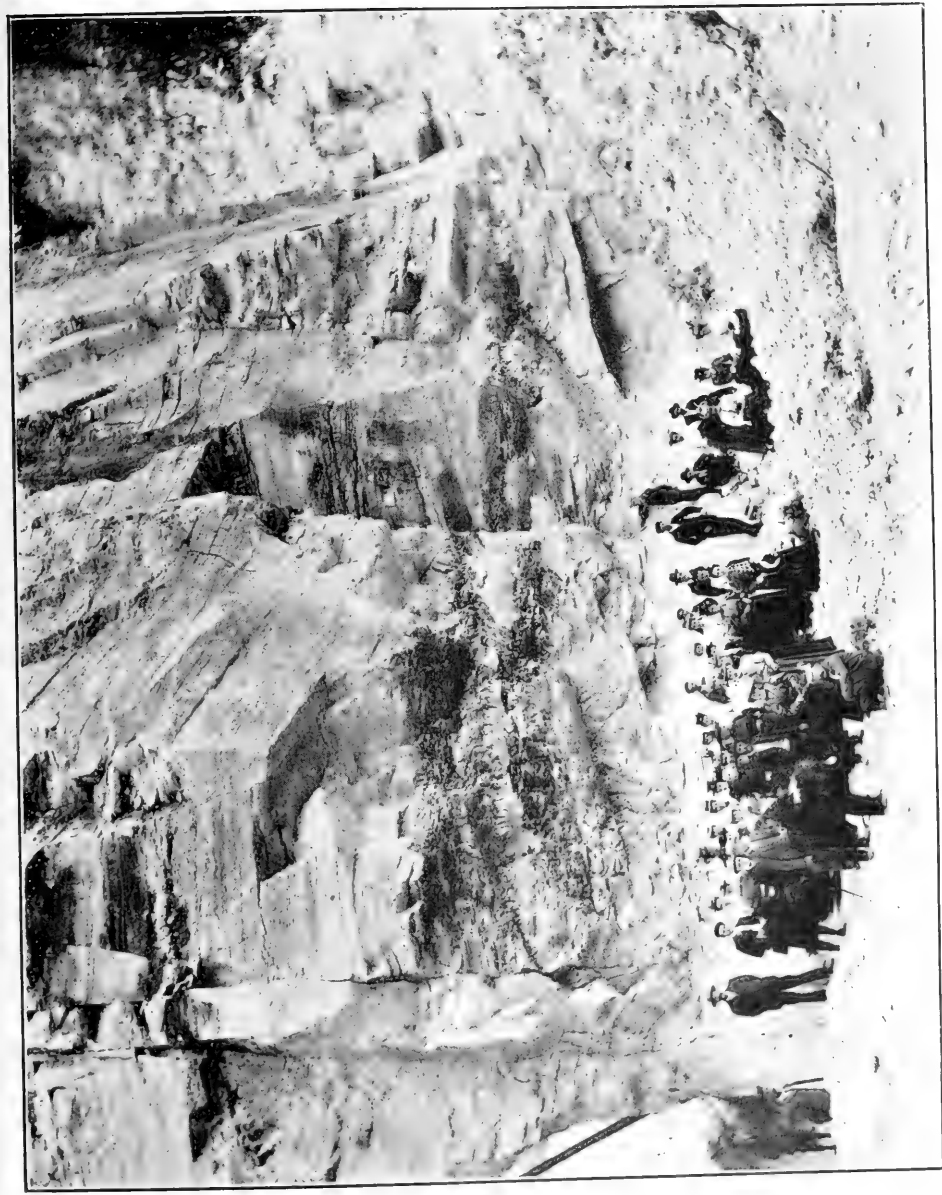
Showing vertical joints and stratification.



GYPSUM BLUFFS DEMOISELLE CREEK, N.B.

Showing entrance to subterranean lake.





GYPSUM QUARRY—HILLSBOROUGH, N.B.
Showing lamination and joint planes.



FIG. 1. POT HOLE NEAR GYPSUM QUARRY.

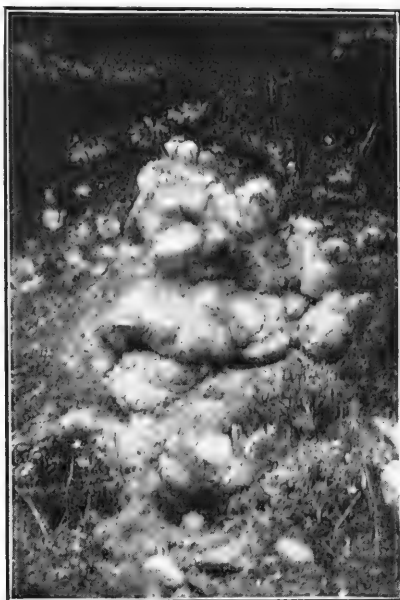
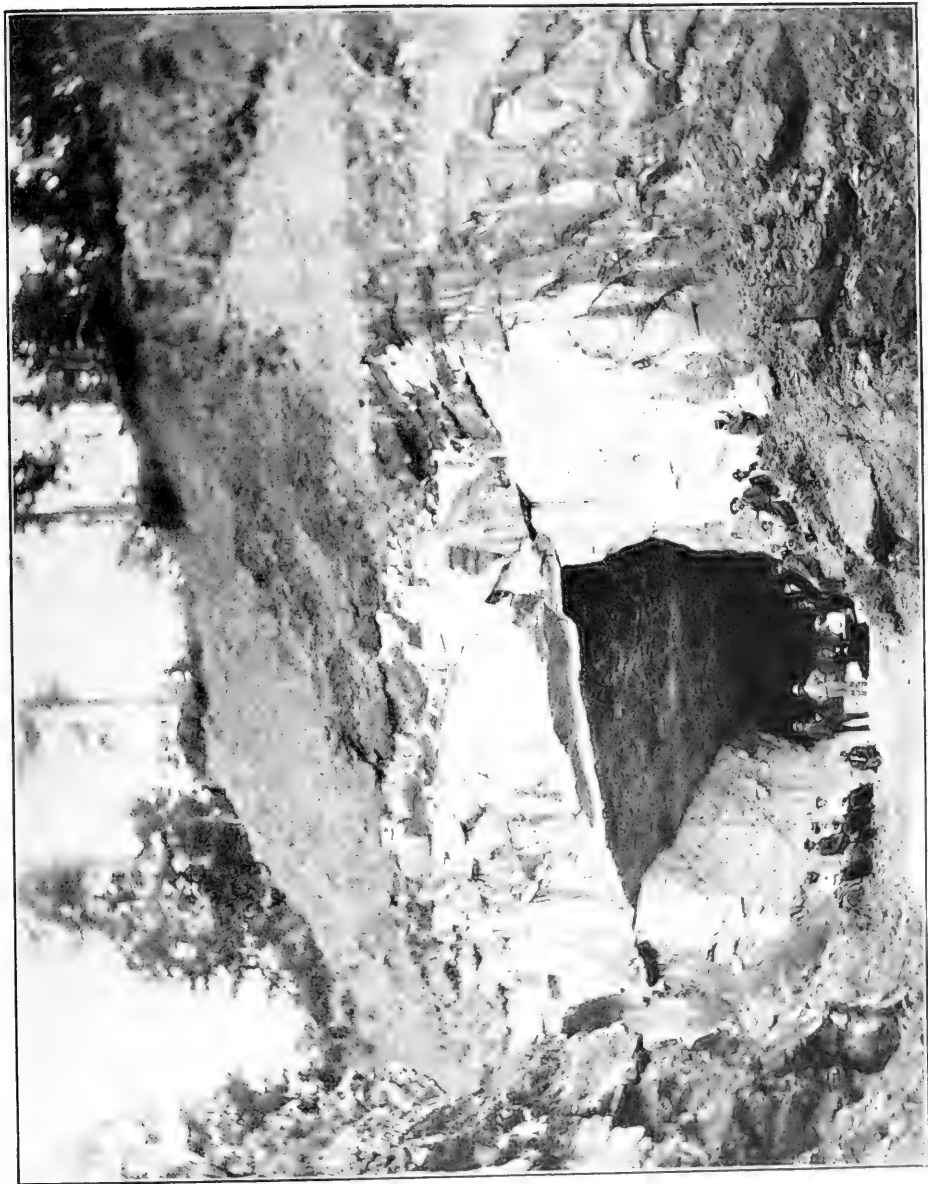


FIG. 2. CONCRETIONS OF ANHYDRITE AND GYPSUM.



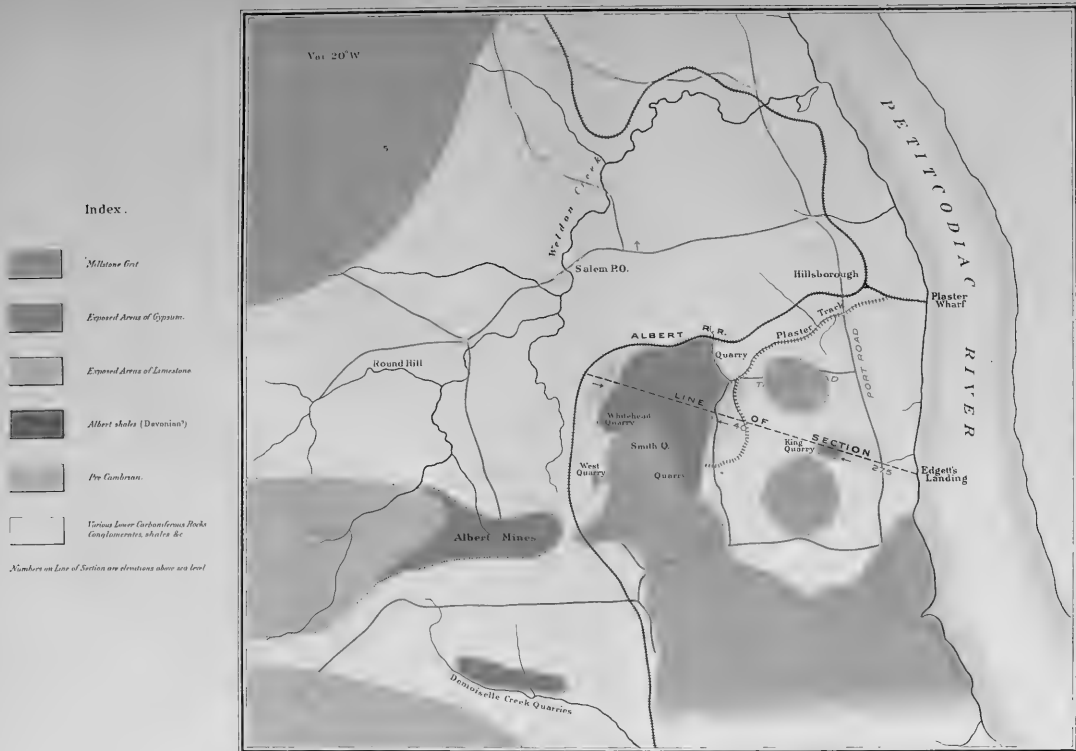
FIG. 3. VERTICAL AND ENLARGED JOINTS IN GYPSUM, NOW FILLED WITH RED CLAY.





GYPSUM QUARRY—HILLSBOROUGH, N.B.

Showing entrance to underground workings and capping of red clay.



GEOLOGICAL MAP OF GYPSUM BEARING AREAS. ALBERT CO. N.B.

Scale: One Inch to a Mile.



Geological Section— from Petitcodiac River to Whitehead Quarry, Hillsborough, Albert Co. N.B.

Scale: 1000 feet to one Inch, horizontal and vertical.

Note: The stratum indicated in blue is Limestone. The beds above are Gypsum, below red conglomerates.



II.—*Sleeping Sickness.*

By SIR JAMES GRANT, K.C.M.G.

(Read May 22nd, 1906.)

At present in England, the subject of Tropical medicine, is attracting widespread attention, and undoubtedly experimental medicine is responsible for the greatest advances which have come to light, within the past few years. The discoveries of Novy and McNeal, are of much importance, the first in fact to obtain pure cultures of protozoa, maintaining trypanosomas of different species, alive. The recent discovery during the past year, of protozoal parasites in the blood of different animals, in addition to many new species of trypanosoma, is of much interest, and more particularly owing to the close affinity of these discoveries, with Sleeping Sickness. So far as known, the first to observe "Sleeping Sickness," was Winterbottom, who wrote a brief paper in 1803, giving an account of the native Africans in the neighbourhood of Sierra Leone. The next reports of importance were those of Dumontier and Santelli in 1868, but by far the most important and accurate account, is by Corre, who studied the disease, in the natives of Senegambia. In 1891 MacKenzie recorded a case of "Sleeping Sickness" in the London Hospital, and in 1900 Manson, made a special record of two cases in Charing Cross Hospital, sent from "The Congo," by Dr. Grattan Guinness: Dr. Mott, the able neurologist of Charing Cross, worked out carefully, the pathological history, and defined the lesion as one of the nature of "meningo-encephalitis." Until within a limited period the geographical distribution of "Sleeping Sickness," was limited to West Africa. For some years, it has also been known in The Congo, as well as in several of the West Coast areas. In 1900 Cook discovered "Sleeping Sickness" in Uganda, since which date the disease has spread widely towards the north shore of Victoria Nyanza Lake.

From the various reports of local observers, the epidemic area of "Sleeping Sickness," is confined to parts of Equatorial Africa. On the Upper and Lower Congo, the disease has been noted in epidemic form, large numbers of the population falling victims to its influence.

As to the cause of this disease, many hypotheses have been propounded in explanation, such as an intoxication of food, animal parasites and bacteria. Since November 1902, Castellani frequently observed "trypanosoma" in "Sleeping Sickness," in fact he discovered trypanosoma in the cerebro spinal fluid of 20 out of 34 patients. Accord-

ing to Dr. Mott, the cerebro spinal fluid in "Sleeping Sickness," always contains trypanosomes, and likewise the juice of the lymphatic glands, by puncture during life. Also states (proceedings Royal Society 1905) "The evidence of the existence of trypanosomes in the blood of animals dying of trypanosomæ disease, may vary very considerably."

Thus far there is a degree of doubt, as to the exact pathological condition, in "Sleeping Sickness" which only time and further researches can decide.

The disease first broke out in the Province of Basoga, where it is supposed to have been introduced by Emin Pasha's Sudanese and their wives and followers, settled in Basoga. This disease had been epidemic in The Congo country, hence the supposition that a certain number were suffering from "Sleeping Sickness" in its incipient condition. In this section of country, the disease assumed such a severe form, that in a short time, it reduced the population of Uganda to a minimum. The chief part of the nervous system influenced by it is the brain, the functions of which become gradually disturbed so much so, that the mental attitude of the patient is soon noticed by the relatives. No desire to work, but rather to rest, owing to headache and pains, more or less in the chest. This disease is quite frequent in the Fooala country and more so in the interior, than on the sea coast, and strange to say, children are seldom affected by it. Those giving evidence of the disease exhibit a somewhat ravenous appetite, eating much more than when in usual health and gradually growing fat; this, however, lasts but a short time, as the appetite declines, and the loss of flesh becomes quite evident. Squinting and convulsions frequently occur before death. The presence of glandular tumours in the neck, are not uncommon in the incipient stage of development, and slave dealers avoid the purchase on that account, fearing the development of "Sleeping Sickness." The disposition to sleep is so strong that the desire for food is not marked. The whip, setons, or even blisters, fail frequently to arouse the patient from the lethargic condition, which is generally fatal in a few months. There is usually a dull, heavy, stupid look, and a characteristic slowness in answering questions, and a well defined shuffling gait. The temperature is remarkable, in the evenings rising to 101° F. and becoming sub-normal in the morning. During the intervals of examination, the drowsy lethargic condition steals on, and when he sits down the head nods, the eyes close, and thus he continues, and until again aroused and questioned. As to the final issue, much depends on whether the disease will develop an acute or chronic form. Tremors of the tongue and arms are not uncommon, the general reflexes become lessened in intensity, and drowsiness gradually lapses into coma, and the patient passes away in

a state of complete insensibility. In chronic cases, the symptoms are slower in development, but usually eventuate in a like fatal issue.

Sometimes preliminary symptoms of an exceedingly slight character, might be in progress for years, and in fact so feebly defined as to be almost sublatent until very gradually the symptoms deepened in intensity, when the gait, speech and food supply, entirely changed from the normal condition, gradually followed by profound coma and death. It is now generally accepted, that this disease is caused by the entrance into the blood of a minute protozoal parasite; the "*Trypanosoma Gambiense*," first described by Dr. Dutton, who while searching out this disease, lost his life on the West Coast of Africa. In South Africa there is a disease known among cattle and other domestic animals, caused by the "*Trypanosoma Brucei*," and conveyed by and communicated from sick to healthy animals, by a "biting fly," the *Glossina Moritans*. The idea followed that "Sleeping Sickness" might be produced in a like manner from a "Biting Fly." "Large collections of these biting flies were made with the remarkable result that the distribution of 'Sleeping Sickness' and of a biting fly, the *Glossina palpalis*, corresponded exactly with each other." Col. David Bruce, R.A.M.C., F.R.S., addressed the meeting of the British Association, on this subject during the recent meeting in South Africa, and brought to light many interesting facts, in this line of research which cannot fail to be of great service.

Sleeping Sickness is not contagious, and, in fact, is only considered infectious, in a limited sense. The disease is generally believed to be fatal, but in a few cases recoveries are vouched for.

Dr. Todd, of McGill University, recently returned from West Africa, having extended his observations over 2,000 miles of "The Free State," from the mouth of the Congo. He favours the idea that nearly all general glandular enlargements, without evident cause, such as syphilis or tuberculosis, are cases of trypanosomiasis. The palpation of these enlarged glands in the posterior triangle of the neck, is considered sufficient evidence of the disease. The juice of enlarged glands removed by the hypodermic needle, is unailing as to the production of trypanosomes, even when not found in the blood. Dr. Todd considers the sleepiness rather as a terminal sign, and not necessarily an unailing symptom of the disease.

Information has just been received (British Medical Journal, May 5th, 1906) that one of the commissioners sent out to Uganda in 1904, by the Royal Society of England, to investigate Sleeping Sickness,

has been infected with the parasites believed to produce the disease. Two officers of the Royal Army Medical Corps, Lieut. Gray and Lieut. Forbes Tulloch, were the commission. Last March an official telegram was received in London, that trypanosomes had been found in the blood of Lieut. Forbes Tulloch, and there is wide spread sympathy expressed for this young and zealous officer, suffering in the cause of science, and the members of the Royal Society of Canada, join heartily in the hope that he may make a safe recovery. Since the discovery of trypanosomes, the parasite has been recognized in seven persons of English birth. Of these, three have died, and four are still living. From most recent date, a proportion of recoveries is to be looked for, in the Trypanosome diseases of man, and that the terminal and fatal condition "Sleeping Sickness," is not inevitable, and although a necessary factor in the production of the disease, not always followed by its development, and much work has still to be done, before a positive opinion is arrived at, as to either the prognosis or treatment of this disease.

"Sleeping Sickness" has been considered by some experts a form of Beri-Beri. Such, however, is not generally accepted. Beri-Beri is in fact a peripheral neuritis, and developed rapidly. The knee reflex is absent in both, and hyperæsthesia of the muscular system, is a striking characteristic. In "Sleeping Sickness" these symptoms are wanting; the tremor, pyrexia and lethargy are marked features.

Professor Robert Koch recently investigated "Sleeping Sickness," for some months in South Africa, and favours the opinion, that this disease has been known on the west coast of Africa, since the beginning of the last century. Sir Claude de Crespigny, visited the hospital at Eutebbe, German East Africa, and considered that the disease is conveyed by the Tse-tse fly, only about two per cent disseminating the fatal germ. It is doubtful whether the disease emanates directly from the fly, or the latter conveys it from dead fish, and is spread like yellow fever, by mosquitoes. In large sections of Africa, the horse is not seen and cannot survive, owing to these insects, and the donkey at one time supposed to be immune, frequently succumbs, a victim to a like influence. Dr. Kock inclines to the opinion, that "Sleeping Sickness" is a form of cerebro-spinal meningitis.

The present interchange of commerce with the numerous tribes in South Africa, from Britain, and nearly all Europe, makes this disease an important problem, not alone, as to the economic future of South Africa, but also as to the outlook in the direction of public health.

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III.—*An Early Anadidymus of the Chick.*

By PROFESSOR RAMSAY WRIGHT,

Biological Department, University of Toronto.

Read May 23rd, 1906.

The embryo which is described in the following pages was prepared and sectioned in June, 1905, for class purposes but its abnormality did not attract attention until it was brought into the laboratory. I am, therefore, unable to figure the surface view, and so far have not had leisure to model out its most interesting features.

The series contains 200 sections of 15 microns in thickness, corresponding to a length of 3 mm. in the hardened condition. The egg had been in the incubator for 24 hours, but, 10 somites having been observed, it was marked as practically equivalent in age to Duval's embryo of 29 hours (No. 1, Fig. 89 and Pl. XVI).

It was noted that the incubator was running at a temperature somewhat higher than the normal, which may account not only for its more rapid development, but also for its abnormality, as may be inferred from Dareste (No. 2, page 121).

Hertwig (No. 3:—Vol. I, p. 993) and others have remarked on the rarity of cases of *Anadidymus* in *Sauropsida* in comparison with the *Ichthyopsida*. This case is of particular interest, because, unlike Hoffmann's (No. 4, page 40) there appears to be no indication of a double primitive streak, and, therefore, it is to be placed in the same category with Dareste's embryo (No. 2, Plate 16, Figs. 5 and 6), and possibly that of Mitrophanow (whose paper I have not been able to consult) cited by Kaestner (No. 5, page 88). The occurrence of such a case does not, in my opinion, invalidate the argument of Kaestner that all such cases are primitively double (No. 6, page 141), because it depends entirely upon the degree, locality and method of the interference of the two components, whether an organ shall appear double or single. My figure of section 131 (Fig. 13) would not be suspected to come from an embryo otherwise than normal, while the inspection of section 126 (Fig. 12) at once shows that each half of it in reality belongs to a different embryo. From this point, the interference caudad has been more complete than cephalad, so that in the backward growth of the primitive streak region (cf. Hertwig, No. 2, pp. 895 and 896) the embryo appears to be single.

Attention must be called to the contrast in the method of interference in the head-region of my embryo and that in Kaestner's (No. 6, Taf. VII) where the ventral surfaces have interfered more than the dorsal, the result being a single heart and a double brain, instead of a double heart and a single brain (cf. my figure 9). The plane of interference becomes caudad more and more truly sagittal, so that the chordæ, at first widely divergent (Fig. 10), eventually fuse, (Fig. 13).

I now proceed to the description of the various systems of organs.

NERVOUS SYSTEM.

As a starting-point, I select section 12 (Fig. 5) through the region of the optic vesicles. It is easy to understand how the condition here pictured is arrived at if we proceed from the normal state as seen in Duval's Figs. 253 and 254. The two embryos have been inclined with their dorsal surfaces towards each other, and have interfered in such a way that the right and left lips of the neural groove of the one, have fused with the right and left lips of that of the other. In this way, no room is left for the complete development of the "median" optic vesicles which, consequently, are very minute (ov'). The points of fusion are still noticeable and it is obvious that that of the left and right lips of the right and left components respectively (which now form the floor of the composite neural canal), is less complete, in such a way that some mesoderm cells have intruded into the neural canal at this point. The double character of the neural canal is brought strongly out by the two infundibula which diverge laterally towards the two blind foregut ends (ph.) beneath which the slightly thickened patches of ectoderm already indicate the hypophyses.

It is less easy to interpret the preceding sections (Figs. 1 to 4), but if two components such as are represented in Duval's Fig. 252 have interfered in such a way as materially to reduce in size the contiguous halves, then it becomes apparent that the convex floor of the composite neural canal in figure 4 is formed of the left and right brain-halves of the right and left components which have fused in the region of their dorsal neural sutures, while their ventral sutures are still widely separated. Still further forward (Fig. 3) these brain-halves are fused so that the most anterior end of the neural canal (Figs 1 and 2) is formed of the lateral brain-halves only of the two components. It is noticeable that the separation of the brain from the ectoderm has apparently taken place sooner than is normal (No. 3, Vol. 2, page 252).

In the diencephalic region (Fig. 6) the brain is much compressed from side to side, but it soon widens out into the mid-brain (Fig. 7).

In the trigeminal region of the hind-brain the neural canal is open for some thirteen sections, but before the auditory region is reached it is again closed as far as section 84, near which point (Fig. 11) there is again a failure to close for a few sections; thereafter, however, the canal is closed as far as section 126, Fig. 12, behind which point the groove is, at first narrowly, and then widely, open.

In section 160 (Fig. 16) the fusion of the ventral wall of the neural groove and the notochord begins and is continued in the following sections (Figs. 17-20), the complete fusion of the ectoderm, chorda, mesoderm and entoderm being attained at the 175th section (Fig. 20). Beyond this point we can hardly speak of a neural groove; the 181st section (Fig. 21), indeed, shows an unsymmetrical fissure which is not uncommon in the primitive groove of normal embryos, and by section 190 all traces of the primitive streak have disappeared and the germinal area presents a normal appearance (Fig. 23). The comparison of my Figures 15-22 with those of Hertwig (1 c., Figs. 536-545, page 891) shows that there is little difference except in the less amount of closure of the neural canal, and without an inspection of sections further forward, it would be impossible to detect any symptom of "duplicitas."

NOTOCHORD.

The conduct of the two notochords has already been sufficiently referred to in the hinder region; it only remains to call attention to their gradual increase in size from their first appearance in section 9 (immediately behind figure 5) till their fusion in section 131, also to their gradual convergence to this point.

MESODERM.

As already remarked there are ten somites, and this is the case with the "median" series of fused somites which lie exactly in the same plane as the lateral ones: Of the "median" series, the seven posterior are better demarcated than those further forward, and are sometimes notched on their ventral surface. The rudiments of the Wolffian body may be seen in the region represented in Figs. 12 and 13.

VASCULAR SYSTEM.

A convenient starting-point for the description of the vascular system is the region depicted in Fig. 10 (section 67), where the vitelline veins are perfectly normal, and the only thing that arrests attention is the "median" descending aorta. Fig. 9 shows that the vitelline veins have not become fused into a single heart as in a normal

embryo. Their endothelial tubes remain independent throughout, but the splanchnic mesoderm¹ does not at first dip in very far dorsad so as to furnish an independent wall for each heart. Further forward, however, it does so (Fig. 8), and eventually the two bulbs of the heart are widely separated and enclose between them a portion of the common cœlome (Fig. 7). But the two heart-tubes as seen in Fig. 9 do not contract gradually into the condition seen in Fig. 8; on the contrary, there is a marked constriction at the opening of each heart into its bulb, beyond which a ventricular *cul-de-sac* extends cephalad for a few sections on each side.

The picture presented by Fig. 6 is best calculated to show the anterior duplicity of the vascular system, because when each bulb approaches the stomatodæum it divides into two ventral aortæ. Of these the lateral aortæ alone form arches up the sides of the pharynx, for the median ones first anastomose below the pharynx, then subdivide into four small vessels which bend round its anterior surface, and finally open into the large vascular space represented in Fig. 5, situated between its anterior diverticula. Tracing this space backwards dorsad of the composite pharynx, we first find four vessels similar to those referred to above, which soon, however, fuse into the "median" dorsal aorta. This retains its size until we reach the segmented region of the embryo, in which it tends to be obliterated opposite the somites and to expand again intersomatically. The "lateral" dorsal aortæ conduct themselves as in a normal embryo, and the same may be said of the veins as far as they are developed.

ENTODERMIC TRACT.

Proceeding cephalad from Fig. 11 in which the median ridge formed of the median row of somites alone distinguishes this from the entoderm of a normal embryo we find nothing remarkable until about midway between Figs. 8 and 9, there the lateral pouches of the pharynx reach a little nearer the ectoderm in the region of the first gill-clefts, but a few sections further forward (Figs. 6 and 5) the two stomatodæa at once arrest attention, as do the two anterior diverticula corresponding to the pouches of Seesel of normal embryos.

I venture to enter a mild protest against Professor Kaestner's note (No. 6, p. 128) on the usage of the words *somatopleure* and *splanchnopleure*. Surely, if it is desirable to have mononyms for "somatic mesoblast," and "splanchnic mesoblast," it would be easy enough to form them instead of using terms which were invented and are constantly used to designate something else. If the language of anatomists knows only one meaning for *πλευρά* that of zoologists is not so restricted. A *Pleuronectid* does not swim on its "pleura!"

In conclusion, in spite of the apparent posterior simplicity of this embryo I am of the opinion that it can best be explained by assuming a double gastrulation at points very close to each other on the surface of the embryonic area.

LITERATURE CITED.

I have thought it unnecessary to cite all the papers consulted. Hertwig (No. 3) and Kaestner (No. 6) give a full list of papers to some of which, unfortunately, I have not had access.

- No. 1. Duval—Atlas d'Embryologie.
- No. 2. Dareste—Production des Monstruosités.
- No. 3. Hertwig—Handbuch der Entwicklungslehre.
- No. 4. Hoffmann—Arch. mikr. Anat. XLI.
- No. 5. Kaestner, Arch. Anat. Phys., '98.
- No. 6. Kaestner, Arch. Anat. Phys., '02.

EXPLANATIONS OF THE FIGURES ON PLATE.

The sections were projected and carefully outlined on the drawing paper by means of the Zeiss Epidiascope and 20 mm. micro-planar, at such distances as to give an enlargement of 102 for figures 1 to 9, and 116 for figures 10 to 23.

Subsequently, the drawings, which were made by Mr. J. R. G. Murray, student in biology, University of Toronto, were reduced rather more than one-third, so that the magnification is respectively 63 and 72.

Figs. 1-4,—Nos. 4, 5, 6, and 8, of the series, through the fore-brain.

Fig. 5,—No. 12, through the anterior blind ends—ph.— of the pharynx. Ov. and ov' the right and left optic vesicles of the right component.

Fig. 6,—No. 19, through the stomatodæa of both components and the diencephalic region; round the composite pharynx are grouped eight arteries; two ventral, and two dorsal aortæ on each side.

Fig. 7.—No. 33, through the mesencephalon. Ventrad of the pharynx are the two aortic bulbs; dorsad, the median dorsal aortæ have united into a single vessel; *re*, ectodermic recess under the head.

Figs. 8, 9, and 10.—Nos. 47, 55, and 67, respectively, through the fifth, seventh and eighth, and ninth nerves.

Fig. 11,—No. 80, through the second intersomite. The median dorsal aortæ have given place to a mass of mesoderm.

Fig. 12,—No. 126, behind the last somite. The chordæ are gaining in size, and the mesodermic mass diminishing. The rudiment of the Wolffian body is seen in this and in Fig. 13.

Fig. 13,—No. 131, the chordæ have fused.

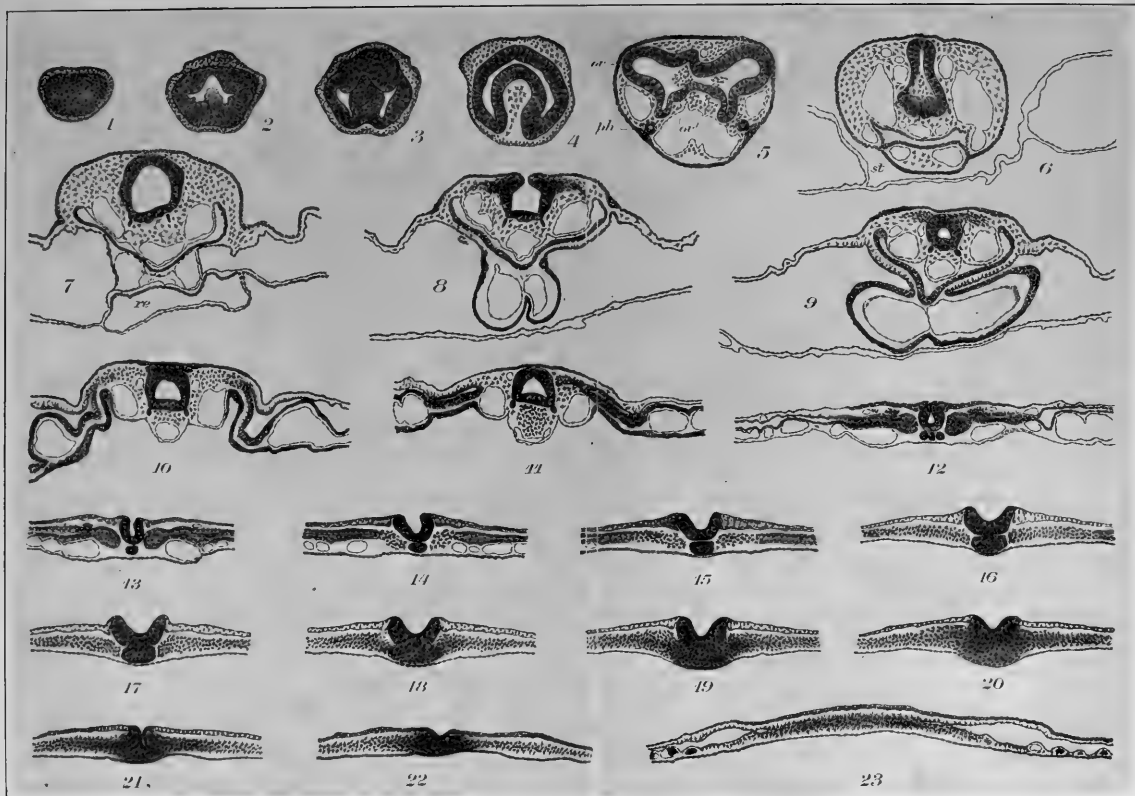
Figs. 14 and 15,—Nos. 150 and 154, the chorda and the wall of the neural groove gain in size.

Fig. 16,—No. 160, the beginning of the fusion between the floor of the neural groove and chorda.

Figs. 17, 18, 19 and 20,—Nos. 164, 168, 171 and 175, respectively, show the progressive fusion of the neural wall, chorda, mesoderm and entoderm.

Figs. 21 and 22,—Nos. 181 and 186, are through the hinder end of the primitive streak. The former shows traces of an oblique fissure.

Fig. 23,—No. 196, shows the nature of the mesoderm behind the primitive streak.



IV.—*Bibliography of Canadian Zoology for 1905.*

(Exclusive of Entomology, but inclusive of papers on foreign zoological subjects by Canadian writers.)

By J. F. WHITEAVES.

(Read May 22nd, 1906.)

MAMMALIA.

BEATTIE, L.

A Foreign Mammal at Guelph.

(According to Dr. C. Hart Merriam, apparently a specimen of the Russian *Putorius evermanni*, or Eversmann's Ferret.)
Ontario Natural Science Bulletin, Guelph, No. 1, p. 42.

DAVIDSON, A. A.

Putorius noveboracensis in Wellington County.

Idem, p. 42.

HUARD, L'ABBÉ V.—A.

Le Gibbar (*Orca orca*, L.)

(A short popular article on the Killer Whale, in which the author states that he has often seen specimens of this species disporting themselves in Tadoussac Bay.)

Le Naturaliste Canadien, Octobre 1905, vol. xxxii, no. 10, pp. 110 and 111.

SAUNDERS, W. E.

Cooper's Lemming Mouse.

(Records the capture of specimens of this species and of the pine mouse, in the region about London, Ont.)

Ont. Nat. Sci. Bulletin, Guelph, No. 1, pp. 24 and 25.

WHITEAVES, J. F.

The Banded Pocket-mouse (*Perognathus fasciatus*).

(Records the capture of a specimen of this species at Aweme, Manitoba, by Mr. Norman Criddle.)

Ottawa Naturalist, June, 1905, vol. xix, no. 3, p. 69.

BIRDS.

ATKINSON, GEORGE E.

A Review—History of the Passenger Pigeon of Manitoba.

Historical and Scientific Society Manitoba, Winnipeg, February, 1905, Transactions No. 68, pp. 1-8.

AUBUSSON, MAGAUD D'.

Le Plectrophane des Neiges (*Plectrophanes nivalis*, Meyer and Wolff).

Le Naturaliste Canadien, Août 1905, vol. xxxii, no. 8, pp. 85-88.

BAXTER, DR. J. MC. G.

Avian Mistakes.

(Records incidentally the circumstance that a specimen of the Turkey Vulture was shot at Loggieville, near Chatham, N.B., in 1899 or 1900; and that a specimen of the Black Vulture was shot at Escuminac, at the mouth of the Miramichi, in 1903.)

Proceedings of the Miramichi Natural History Association, No. iv, pp. 9-11.

BEATTIE, F. NORMAN.

The Woodcock's Notes.

Ont. Nat. Sci. Bulletin, Guelph, no. I, pp. 40 and 41.

BISHOP, LOUIS B.

The Gray Sea Eagle (*Haliaeetus albicilla*) in British Columbia.

(Records the fact that a bird, which proves to be a young male of this species in its first winter's plumage, was shot on the coast of Vancouver Island in March, 1898.)

The Auk, January, 1905, New Series, vol. xxii, no. I, p. 81.

BOUTELLIER, JAMES.

Bird Migration. Observations made at Sable Island, Nova Scotia.

Ottawa Naturalist, September, 1905, vol. xix, no. 6, pp. 119 and 120.

BROOKS, ALLAN.

Clay-coloured Sparrow in the Cariboo District, British Columbia.

The Auk, January, 1905, New Series, vol. xxii, no. I, p. 83.

Notes on the Nesting of the Varied Thrush.

(Records the finding of five nests, with eggs, of birds of this species, in southern British Columbia, at the base of Cheam Peak, on the Lower Fraser, in April and May of 1903.)

Idem, April, 1905, New Series, vol. xxii, no. 2, p. 214.

CLARKE, DR. C. K.

Ring-billed Gulls (*Larus Delawarensis*) on Lake Ontario.

Ottawa Naturalist, July, 1905, vol. xix, no. 4, p. 88.

A Flicker Tragedy.

Ont. Nat. Sci. Bulletin, Guelph, No. 1, pp. 39 and 40.

DEAN, RUTHVEN.

A Brood of Albino Spoonbill Ducks (*Spatula clypeata*.)

(Photographs of three birds of this brood, which were shot "near the Saskatchewan River, at a point near Edmonton," by Mr. Alexander Calder, in June, 1904, are reproduced in the Ottawa Naturalist for December, 1905.)

The Auk, October, 1905, New Series, vol. xxii, no. 4, p. 408.

EIFRIG, REV. C. W. J.

Nesting of the Nighthawk in Ottawa.

Ottawa Naturalist, May, 1905, vol. xix, no. 2, pp. 56-58.

Ornithological results of the Canadian Neptune expedition to Hudson Bay and northward. 1903-1904.

The Auk, July, 1905, New Series, vol. xxii, no. 3, pp. 233-241.

- The Golden Eagle (*Aquila chrysaetos*) near Ottawa.
 (Records the fact that a "bird of the year, of this species," was caught in a "trap set for otter or muskrats, near High Falls, Wright Co., Quebec," in 1905.)
 Idem, p. 310.
- A One-legged Crow (*Corvus brachyrhynchos*).
 Ibid., p. 312.
- An Unusual Abundance of the Canada Jay (*Perisoreus Canadensis*) in and near Ottawa, Ont.
 Ibid., p. 313.
- A Curious Anomaly in the White-throated Sparrow (*Zonotrichia albicollis*).
 (The anomaly consists of the unusual length of one of the tail feathers.)
 Ibid., p. 313.
- The Migrant Shrike (*Lanius ludovicianus migrans*) at Ottawa, Ont.
 Ibid., p. 314.

FLEMING, JAMES H.

- An Unusual Migration of Ducks in Ontario.
 The Auk, April, 1905, New Series, vol. xxii, no. 2, p. 206.
- An Unusual Migration of the Canada Jay.
 Ont. Nat. Sci. Bulletin, Guelph, no. 1, pp. 11 and 12.

HOBSON, W. D.

- A Black-crowned Night Heron in Ontario in Winter.
 Idem, p. 38.

FLUGH, A. B.

- Bird notes from Central Ontario.
 Ottawa Naturalist, July, 1905, vol. xix, no. 4, p. 87.
- Ontario Ornithological Notes.
 Idem, September, 1905, vol. xix, no. 6, pp. 121-123.
- The Pine Siskin breeding at Guelph, Ontario.
 The Auk, October, 1905, New Series, vol. xxii, no. 4, p. 415.
- The Birds of Wellington County, Ontario.
 Ont. Nat. Sci. Bulletin, Guelph, no. 1, pp. 1-10.
- The Purple Finch a Songster.
 Idem, p. 39.
- The Call of the American Bittern.
 Ibid., p. 41.

MAUREL, LOUIS.

- De l'Utilité des Oiseaux.
 Le Naturaliste Canadien, Mai 1905, vol. xxxii, no. 5, pp. 55 and 56.

MOORE, W. H.

- The Red-breasted Nuthatch (*Sitta Canadensis*).
 Ottawa Naturalist, October, 1905, vol. xix, no. 6, pp. 139-141.

NASH, C. W.

Check List of the Vertebrates of Ontario, and Catalogue of Specimens in the Biological Section of the Provincial Museum. Birds.

Department of Education, Toronto, pp. 1-82.

The Robin and the Fruit Grower.

Canadian Horticulturist, July, 1905, pp. 249-251.

Papers on "The Nesting Season," the "Night Hawk and Whip-poor-Will," and on "The Chimney Swift," in the Farming World, Toronto, for June, July and August, 1905."

TAVERNER, P. A.

The Origin of the Kirtland's Warbler.

Ont. Nat. Sci. Bulletin, Guelph, no. 1, pp. 13-17.

YOUNG, A. F.

Bird Notes from Penetanguishene, Ontario.

Idem, pp. 38 and 39.

YOUNG, REV. C. J.

The Thrushes of Eastern Ontario.

Ibidem, pp. 17-20.

FISHES.

COX, DR. PHILIP.

Extension of the list of New Brunswick Fishes.

Proceedings of the Miramichi Natural History Association, no. iv, pp. 41-44.

PRINCE, PROFESSOR E. E.

I. Canadian Sturgeon and Caviare Industries.

II. Methods of Coarse Fish Extermination.

Thirty-seventh Report of the Department of Marine and Fisheries, 1905. Special Appended Reports, pp. liii-lxxxii.

INVERTEBRATA.

BAKER, F. C.

New species of *Lymnæa*.

(In this paper a variety of *L. stagnalis*, from Michipicoten Bay, on the north shore of Lake Superior, is described as var. *higleyi*, "in honor of Professor William K. Higley, Secretary of the Chicago Academy of Sciences.")

The Nautilus, April, 1905, vol. xviii, no. 12, pp. 141 and 142.

DALL, W. H.

Alaska. Volume xiii. Land and Fresh Water Mollusks.

(This important memoir includes a "summary of our present knowledge of the mollusks" of North America north of latitude 49° north, "deduced in part from the literature, and in larger part from material actually examined." It includes and practically almost supersedes the previous and scattered literature relating to the land and

fresh water mollusca of the Dominion, and is quite indispensable to the student thereof. Of the eight new species figured in the two Plates, five are found in Canada.)

Harriman Alaska Expedition. New York, Doubleday, Page and Co., 1905, pp. 1-153, with text-figures 1-118, and Plates I and II.

HENDERSON, DR. E. H. (McGill University, Montreal.)

Some Observations on the Development of an Asterid with Large Yolky Eggs, from the Franklin Islands.

Annals and Magazine of Natural History, London, England, Seventh Series, vol. xvi, pp. 387-391, and Plates xii and xiii.

HUARD, L'ABBÉ V.—A.

Le Dragonneau, ou *Gordius aquaticus*, L.

Le Naturaliste Canadien, Novembre 1905, vol. xxxii, no. ii, pp. 119-122.

JENSEN, A. S.

On the Mollusca of East Greenland. 1. Lamellibranchiata.

(Incidentally mentions the fact that the little tellinid from the Gulf of St. Lawrence which has been called *Macoma inflata*, is not the *Tellina inflata* of Chemnitz, and that the former should be called *Tellina (Macoma) Loveni*, Iap. Steenstrup (1882).

Meddelser om Grönland, Copenhagen, vol. xxix, pp. 289-362.

LAMBE, L. M.

A New Marine Sponge (*Espereilla Bollabellensis*) from the Pacific Coast of Canada.

Ottawa Naturalist, April, 1905, vol. xix, no. I, pp. 14 and 15, pl. I.

MACBRIDE, PROFESSOR E. W.

The Canadian Oyster.

Canadian Record of Science, July, 1904, vol. ix, nos. 3 and 4, pp. 145-156. Issued April 20, 1905.

Development of *Ophiothrix fragilis*.

Idem, for October, 1904, vol. ix, no. 5, p. 316.

Issued May 15, 1905.

ODELL, W.

Notes on Fresh-water Rhizopods.

Ottawa Naturalist, April, 1905, vol. xix, no. 1, pp. 16-20.

PRINCE, PROFESSOR E. E.

The Hair-eel (*Gordius aquaticus*, L.).

Idem, October, 1905, vol. xix, no. 7, pp. 131-138.

STAFFORD, DR. J.

On the larva and spat of the Canadian oyster.

American Naturalist, January, 1905, vol. xxxix, no. 457, pp. 41-44.

Trematodes from Canadian Vertebrates.

Zoologischen Anzeiger (Leipzig) April xi, 1905, bd. xxviii, pp. 681-694.

STERKI, DR. V.

New varieties of North American *Pisidia*.

(Two specimens of one of these varieties, viz. *Pisidium fallax*, var. *errans*, were collected at Ozhiski Lake, Keewatin, by W. McInnes in 1904.)

The Nautilus, November, 1905, vol. xix, no. 7, pp. 80-84.

WHITEAVES, J. F.

"Notes on some fresh-water shells from the Yukon Territory"; and
"List of a few species of land and fresh-water shells from the immediate vicinity of James Bay, Hudson Bay."

The Nautilus, May, 1905, vol. xix, no. 1, pp. 1-4; and Ottawa Naturalist, June, 1905, vol. xix, no. 3, pp. 63-66.

List of land and fresh-water shells from the District of Keewatin, collected by W. McInnes in 1904.

Geological Survey of Canada, Summary Report for 1904, Ottawa, 1905, pp. 160-164. Separates issued in June, 1905.

Description of a New Species of *Goniobasis* from British Columbia.

The Nautilus, October, 1905, vol. xix, no. 6, pp. 61 and 62, pl. 2, figs. 11 and 12.

Some new localities for Canadian land and fresh-water shells.

Ottawa Naturalist, December, 1905, vol. xix, no. 9, pp. 169-171.

MISCELLANEOUS.

HALKETT, ANDREW.

Preliminary Report upon the animal life observed during the Hudson Bay Expedition of 1903-04.

Thirty-Seventh Annual Report of the Department of Marine and Fisheries for 1904, Ottawa, 1905, pp. xlvii-xlix.

A Naturalist in the Frozen North.

Ottawa Naturalist, July, August and September, 1905; vol. xix, no. 4, pp. 79-86; no. 5, pp. 104-109; and no. 6, pp. 115-117.

HUARD, L'ABBÉ V.—A.

Traité Élémentaire de Zoologie et d'Hygiène.

Le Naturaliste Canadien, vol. xxxii, Supplement, pp. 221-260, with title page and preface.

OTTAWA FIELD NATURALISTS CLUB.

Report of the Zoological Branch, 1904.

Ottawa Naturalist, June, 1905, vol. xix, no. 3, pp. 70-72.

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"Field Work at the Ottawa Normal School Summer Course for Teachers." (July 4th to 21st—largely Botanical). The Ottawa Naturalist, XIX, 5, pp. 111-114, Aug. 1905, Ottawa.

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"Fresh Water Life." Proc. Miramichi Nat. Hist. Ass'n., IV, 12-18 (Desmids, diatoms, etc. in Water, Chatham, New Brunswick). Chatham, N. B., 1905.

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"Proceedings of the Club." (Torrey Botanical Club, 30 Nov. 1904—References to Nova Scotia Plants by C. B. Robinson). Torreya V, 1, pp. 14-16, Jan. 1905, New York.

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"Forest Fires in British Columbia." Can. For. Ass'n. 6th Ann. Rep., pp. 18-21, 9th Mar., 1905, Ottawa.

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"The Gaspesian Forest Reserve," pp. 109-112.

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"The Poplars," pp. 120-123.

"Notes etc.," pp. 124-141. July, 1905, Ottawa.

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"Montreal Forest Congress," pp. 147-154.

"The Balsam Poplar," pp. 176-177.

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"Minutes of First Annual Meeting at Ottawa, 15, 16, June, 1904, with Constitution etc., pp. 1-28, 1904, Ottawa.

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"Report of Second Annual Meeting, Ottawa, 27-29 June, 1905." (Part 1. Minutes, Reports of Directors, Secretary, Provincial Superintendent and discussion pp. 1-24. Part 2; Constitution, By-laws and Regulations pp. 23-34. Part 3 Addresses and papers presented, pp. 35-108). Pp. 1-108, 4 plates, 1905, Ottawa.

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"Care of Street Trees," Can. For. Jour., I, 2, pp. 70-74, Apr., 1905, Ottawa.

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The Ottawa Naturalist, xix, 8, pp. 156-157, Nov., 1905, Ottawa.

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FERNALD, M. L.

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VI.—*South African Iron Formations.*

By A. P. COLEMAN.

(Read May 23rd, 1906.)

While in South Africa with the British Association last summer two interesting localities were visited where silica interbanded with iron ore is well displayed, and having come directly from the Keewatin Iron Formation north of Lake Superior, I could not help being deeply impressed with the resemblance of these formations in such widely separated localities.

Our Canadian iron ranges in northern Ontario are always associated with the banded rocks just mentioned, red jasper with darker bands of hematite or magnetite, or white or gray granular silica alternating with darker bands containing magnetite; which are found as ridges in the Keewatin of Ontario, as well as in the United States to the west and south of Lake Superior. Since many of the great ore bodies of that famous iron region have been formed by the secondary concentration of hematite or limonite from lean rocks of the kind described, it is of interest to compare the iron formations of the two regions.

South African geologists themselves have pointed out the resemblance, so that no originality can be claimed by the present writer in calling attention to it; but a direct comparison of some of the South African rocks and their geological associations with the similar rocks of the Lake Superior region may be of value from the scientific side, and may give hints as to the probability of workable bodies of iron ore occurring in various colonies in South Africa.

The first examples observed of banded silica resembling the iron formation were found as boulders and pebbles in the Dwyka conglomerate near Matjesfontein in the Karoo (Cape Colony); somewhat as the Canadian iron formation is found as pebbles in the basal Huronian conglomerate. Their original home could not be determined with certainty, however.

The next locality was on Hospital Hill, a well-known suburb of Johannesburg in the Transvaal. Here beautifully banded specimens may be found, sometimes straight and even, but often as much folded and contorted as in our own Keewatin rocks. The banding is of white, brownish and reddish silica, distinctly granular, but very fine grained, with somewhat crystalline hematite and a little magnetite.

The associated rocks are red Hospital Hill slate and gray sandstone or soft quartzite. The sheets of banded silica generally seem to be interbedded with the other rocks as if belonging to the succession, but sometimes they are locally crumpled, though the rocks above and below seem undisturbed. The adjoining rocks are much less consolidated and metamorphosed than those enclosing our Keewatin iron ranges; but banded silica belonging to the Animikie (upper Huronian) in America occurs with somewhat similar slate and soft quartzite.

The banded siliceous rock of Hospital Hill has been called "calico rock," and is briefly described by Hatch and Corstorphine in papers on the geology of the Rand.¹ Prof. Hatch puts the Hospital Hill slate near the top of the Witwatersrand system, which overlies unconformably the Swaziland beds, looked on as Archæan. According to this succession the banded rocks are later than the Keewatin, but perhaps not later than the Animikie.

Banded silica with iron ore occurs also in Natal, associated with the Barberton series of slates or schists, placed by the Natal geologists in the Archæan. My only specimen, from N'Gotsche mountain, is partly cherty and partly quartzitic in look, the bands being gray or brownish black. Unfortunately I had no opportunity to see a typical outcrop, since our field work lay chiefly on the Dwyka.

The banded iron formation is widely found in Rhodesia and I had an opportunity to study a fine outcrop on a kopje near Salisbury, where the rock stands up as a sharp ridge overlooking the town and plain. No jasper occurs, but sandy looking or quartzitic silica is interbanded with iron ore, the whole often greatly crushed and folded. The material is exactly like the iron range rock of the Michipicoten region in Ontario; but the many loose blocks scattered over the hill give a very different general impression from the smoothly glaciated surface of such ridges in Canada. The blocky character is no doubt due to splitting by sudden changes of temperature between night and day in the dry climate of the region. The enclosing rocks were hidden under debris, but the nearest kopje is of granite, and the region, so far as seen by our party, may be Archæan.

A specimen of bright red banded jasper given me from northern Rhodesia is closely like the so-called "jaspilite" of the Vermilion range in Minnesota, but I have no information as to its geological surroundings.

¹ Trans. Geol. Soc. S. Af., Vol. VII, Part II, 1904, p. 100; also *ibid.*, Part III, pp. 147 and 8.

Mr. F. P. Mennell, of Bulowayo, describes the Banded Ironstone series of southern Rhodesia as of Eparchæan age, and says of it "the characteristic feature of these beds is the peculiar banded flinty rock, which appears under the microscope to be in all probability an altered fine-grained mechanical sediment, silicified and highly charged with ferruginous material, arranged in parallel bands. They alternate with sheared conglomeratic and arenaceous beds, slates (phyllites) and gneissic bands, which may result either from the crushing of acid intrusions or of tuffs. These beds are usually almost vertical to all appearance, but this may be due to folding at right angles to their real direction, or to repetition over and over again by faulting; in any case it is possible to travel over them for many miles in a direction at right angles to the apparent strike."¹ He correlates them with the Griqua Town series of Cape Colony and the Hospital Hill series of Johannesburg.

Except for the immense width of the banded ironstones his description might apply very well to many outcrops of the iron formation in Canada, but his statement that the silica is altered from a fine grained mechanical sediment seems doubtful in the light of American investigations, which favour chemical sedimentation or deposit from solutions obtained from basic eruptives. A thin section of a specimen from Salisbury shows the silica as completely interlocking anhedral with no hint of water rolled grains. In appearance it is exactly like a thin section of similar iron range rock from near the Helen mine, Ontario.

Banded ironstones are widely found in northern Cape Colony, especially in the Prieska region, as described by Mr. A. W. Rogers of the provincial survey. They occur mainly in the Griqua Town series consisting "of peculiarly heavy green slaty rocks with quartzites and jaspers containing large quantities of magnetite. Much of the rock is banded, the thin layers having slightly different colours of which deep red, bright red, brown and black are the most usual. The black layers are almost entirely composed of minute crystals and grains of magnetite with a little quartz between the grains, every intermediate stage between almost pure magnetite and pure quartzite can be found." "The jaspers are very fine grained rocks which break with a smooth conchoidal fracture. They are made up of extremely minute crystalline particles of quartz, and are coloured by oxides of iron of various degrees of hydration."² This account might be applied without change to our American Iron Formation.

Mr. Rogers has been good enough to send an interesting set of specimens of these jaspery rocks, and also of the crocidolites found

¹ Geol. of Southern Rhodesia, Rh. Mus., Special Rep., No. 2.

² Geology of Cape Colony, pp. 73-4.

more or less associated with them, and of a remarkable glacial deposit overlying them. The red jasper is closely like our own, and brown banded specimens are like some phases of the Helen Iron Formation, but a black finely laminated specimen is of a different type from any Canadian example. A piece of brown jasper is indistinguishable from specimens obtained at the Helen mine.

The splendid brown or dark green crocidolite, with its beautiful silky lustre, associated with the lower part of the rocks containing banded iron ore is not at all matched in appearance by the dark green hornblende, grünerite, associated with magnetite in our own iron ranges. The composition of the asbestos and of the grünerite is, however, quite similar, each consisting largely of silica and ferrous oxide. The crocidolite (according to Dana) contains, however, much ferric oxide and a little soda also.

Rogers mentions oölitic rocks associated with the banded iron bearing series, suggesting the oölitic jaspers of our Animikie, though very different in appearance. Oölitic jasper has never been reported from the more ancient Keewatin Iron Formation of America, but only from the Upper Huronian iron bearing rocks. In some places the Griqua Town beds containing the banded silica and iron ore are much folded, and they often rise as isolated patches above the general surface of granite and gneiss, apparently much as our own iron ranges do in parts of northern Ontario. In other places, however, they overlie conformably limestones and other rocks of the Campbell Rand group, and lie nearly flat. In Ontario the Iron Formation has been found associated with crystalline limestone only in one place, Goudreau lake, north of Lake Superior; and is usually more nearly vertical than horizontal in attitude.

In his latest publication ¹ Rogers describes curious breccias of large and small fragments of banded jaspery rocks and cherts with a matrix of hematite or silica or a mixture of the two. "In places the rock appears to be made of little else than hematite, and when broken open faint outlines of angular fragments of banded rock, now converted into hematite, can be seen embedded in a matrix of hematite." This description would apply very well to some of our ore deposits, as at Helen mine, where a breccia of the Iron Formation has been transformed into lean ore.

The age of these South African iron bearing rocks, so similar to our American Iron Formation in structure, chemical composition and relationship to adjoining rocks, is not very certainly determined. There

¹ Campbell Rand and Griqua Town Series in Hay, Trans. Geol. Soc. of South Africa.

seems good evidence in writings of the South African geologists that rocks of the kind belong to more than one age, but that all are relatively ancient.

Unfortunately fossils have never been found in South Africa in rocks beneath the Devonian, so that lower rocks can be classified as to age only by stratigraphical or lithological methods.

The Griqua Town series of northern Cape Colony and the Campbell Rand series, into which it passes downwards, are followed by two or three lower series of rocks, separated from one another by unconformities; while above the Griqua Town series the Pre-Cape rocks and the Table Mountain series intervene before the Bokkeveld series is reached, from which Devonian fossils are known.

As the Keewatin rocks, containing our most important iron formation, are the oldest known rocks of their region and have nothing beneath except the Laurentian eruptives which have burst through them, it appears that our Helen Iron Formation, for instance, must be more ancient than any of the South African iron bearing rocks. However, banded silica with iron ore occurs also in higher formations in America, especially the Animikie, or Upper Huronian of the latest classification, with no less than three important breaks between it and the Keewatin; so that the Animikie may be of somewhat the same age as the South African iron bearing formations. Since banded silica with iron ore occurs at more than one horizon in South Africa, some outcrops of these rocks, as in the Barberton series of Natal or the occurrence near Salisbury in Rhodesia, may be much lower down in the geological scale than those of the Prieska region, and may represent our Keewatin Iron Formation, or the Lower Huronian, which comes next in order above it.

Whether the South African and the North American rocks containing interbanded silica and iron ore are of the same age or not, they clearly indicate similar conditions of deposit in very ancient times and in very different parts of the globe. Why these curious and important types of rock, consisting essentially of silica and iron, should have formed only in ancient seas (Pre-Silurian at least), and not in later times, remains mysterious; and for the present it may be sufficient to call attention to the fact that our own Pre-Cambrian formations of banded silica and iron ore which have attracted so much attention and speculation, are by no means unique, but are repeated on an even larger scale in the southern hemisphere.

It is rather singular that iron-silica rocks of a banded character have not been reported from Europe and other regions, when they are found occupying hundreds of square miles among the more ancient rocks of North America and South Africa. One can hardly imagine that con-

ditions causing the alternate precipitation of silica and iron should have been very widespread in two continents, and absent in all other regions; and it may be that they have simply been over-looked in other parts of the world.

The mode of formation of the banded iron-silica rocks is by no means finally settled. Some American geologists think them derivations from an original siliceous siderite, rearranged by heat, circulating water, and certain reagents; but in a great many of the outcrops in Ontario, and, I believe, in all of the outcrops described in South Africa, siderite is absent. It is possible, of course, that in these cases the siderite has been completely rearranged, but it seems more probable that the stratified looking iron ore and silica were originally deposited on a sea bottom, though perhaps not in their present form. The character of that sea must have been very different from any known at present, and one is tempted to speculate as to solvents and precipitants which could act over hundreds of miles of sea bottom, piling up beds of crystalline silica and magnetite or hematite still hundreds of feet thick after all the erosion they have undergone. This, however, would lead too far.

South Africa is fairly well provided with coal, and a time may come when iron will be produced in the different colonies. Judging from American iron mining regions large and rich ore deposits of secondary origin may be looked for wherever the lean iron bearing rocks have been enclosed in basins permitting a slow concentration. That such deposits of economic importance will be found in South Africa seems very probable.

VII.—*Bibliography of Canadian Entomology for the Year 1905.*

Contributed by REV. C. J. S. BETHUNE, D.C.L.

(Read by title, May 23rd, 1906.)

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Meal Worms, March 1; August, 23.

The Onion Maggot, April 19 and 26; May 31.

The Hemlock Gelechia, May 10.

The Carrot Maggot, May 31.

Fumigation for killing Bed-bugs, July 5; Sept 27.

Grape-vine leaf-hoppers, July 5.

Bee Carpenters, August 9.

The Buffalo Carpet Beetle, August 23.
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The Walking-Stick Insect, September 27.
Root Maggots, October 18.
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Whom shall we follow? (A further discussion of the genus *Venusia*, in reply to the Rev. G. W. Taylor). Can. Ent., xxxvii, 331-332.

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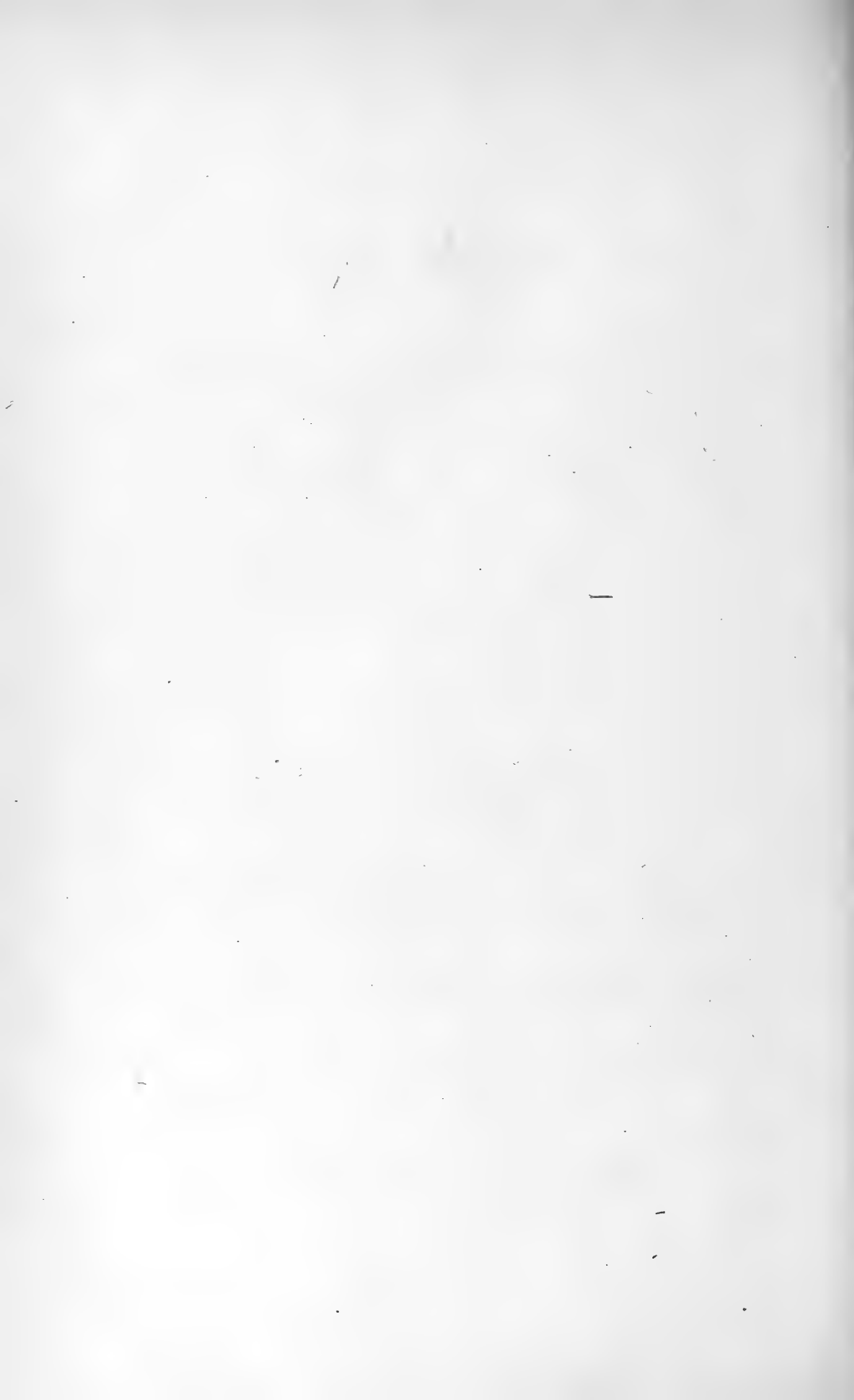
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Sec. IV., 1906. 5.



VIII.—*Features of the Continental Shelf off Nova Scotia.*

By H. S. POOLE.

(Read May 23, 1906.)

Off the southern shore of this Province much relating to the sea-bottom has been revealed by the investigations of the hydrographer, and the operations of the cable laying companies.

The information thus obtained together with that collected by fishermen in the pursuit of their calling presents features that suggest a consideration may well be given its structure closer than has yet been bestowed on it.

The present paper proposes to deal with the strip of submarine ground that lies shoreward of the 80 fm. line running approximately parallel to the coast at an average distance of about 100 miles off the land. Close to this line the edge is met of the marine terrace or platform that projects seaward from under the east coast of the greater part of the North American continent. The rapid drop into deep water along the edge of this terrace or continental shelf is indicated on the accompanying map by the contour lines which the soundings given on Admiralty charts enable one to lay down. The edge thus defined appears as a fairly straight line with but few deflections indenting for short distances towards the land that is in addition to the two ravines of magnitude that sever the region and reach back to the coast.

But had the soundings on which the position of this line has been determined been taken much closer together than they have been, especially along the margin, there is a probability they would indicate some such decided features as steep escarpments and possibly some precipitous walls along the side of the platform with short ravines other than those recognised serrating the edge and also exposing the remains of fjords as yet but imperfectly silted up with later sediments. In one respect our coast differs from the portion of the shelf south of Cape Cod where its slope to the abyss is more gradual and where there is off Hatteras a second terrace distinguished as the Blake plateau.

In our section outside the 80 fm. line the soundings rapidly drop into deep water, and a plunge to depths of 1000 fms. or more is made within a further distance of 2 to 10 miles.

It is particularly desired to note that along the Atlantic front of the platform for the whole region lying off between Cape Sable and Seaterie but two deep channels or fjords break the wall and extend

inwards towards the coast; one, Sambro channel, is immediately south of Halifax, and the other passing to the east of Sable Island is called by fishermen, the Gully. The special interest that is attached to these depressions will be referred to at length later on.

To the continental shelf to the south of us its extent and the prominent features of the foreshore many writers have made reference. Some parts have been closely examined, and special soundings have supplemented the earlier work of the British Admiralty and the Navigation Bureau of the United States. The results of the investigations have been published,¹ but of our own shores I have not been able to find more than passing reference, and that little merely made to round up generalizations suggested by the more southern investigations and the European disquisitions on the general subject. Among those who have lately written may be mentioned Dr. Chalmers of the Canadian Geological Survey, Professor J. W. Spencer at one time of King's College, Windsor, Dr. H. Y. Hind, Professor Hull, of England, and Mr. W. Upham of the United States Survey. Their articles cover all that has been published relating to the ground under review that have come under the eye of the author, and they have left much to be still considered. In connection with the subject and the bearing which the glacial evidences have to the special features of this region much of interest to the student will be found in that comprehensive work—"The Ice Age in North America" by Dr. G. W. Wright.

Viewed from a provincial and more contracted standpoint, the details of our immediate neighbourhood may be dwelt on and of the phenomena exhibited explanations may be offered in the light of investigations made and conclusions reached by others. This may be done with more confidence now that deductions drawn from widespread observations enable application to be made to examples from our own locality in illustration of the stupendous changes that have taken place within comparatively recent geological ages, to movements of vast magnitude and to results effected in periods of time appearing to us individually to be of great length but which are in comparison with the æons that preceded them as the playtime of an ephemeron of yesterday.

Some incidental references to submarine geology appear in the Transactions of the Nova Scotia Institute of Science, but they are not of a general character. A paper by Mr. S. D. McDonald in 1886² is replete with information on Sable Island; its history and geology. In it he speaks of the existence of that island as due to the strong ocean

¹ A. Leudenkohl—Notes on the submarine channel of the Hudson River, *Am. Jour. Sc.*, June, 1891.

² Vol. VI., pp. 266, 278.

currents which swirl round its beaches, of the diminution it has suffered, also of its changed position and to the influence the winds have had in building it up in dunes above the level of the sea. Mr. McDonald accepts the view of Dr. D. Honeyman that the present shore of Nova Scotia is on the line of the continent's great terminal moraine, and he imputes the origin of the great Banks to the deposition of the Champlain sands washed out of the glacial drift by the recessional floods.

The subject of this paper is necessarily connected with that of the glaciation of the country at large, a matter that has been in part discussed by several local writers, by Sir J. W. Dawson, Dr. Bailey, Mr. Prest, Dr. Honeyman, and in still earlier times by Mr. T. Belt, a recognized authority of his day some forty years ago. All these writers, however, stop short at the shore with but casual reference to what may lie beyond. They are not unanimously of opinion with that of observers south of the international boundary and they leave many glacial questions still open for general discussion, such as whether the ice cap covered the whole country, whether it effected much or little erosion of the surface; whether it merely removed the loose and disintegrated material, rubbing down to a rounded outline the rocky angularities, or planed away a great thickness of solid strata; whether the period of action was comparatively short or long drawn out, of late date or occurred in a remote past; whether the ice sheet was thick or thin, subject or indifferent to the inequalities of the surface over which it flowed.

With these questions in their relation to the evidence to be obtained from the land surface it is not proposed to deal. It will not be possible, however, to avoid indirect reference to a few of them in the consideration of some features of the submarine structure which this paper introduces.

Marine charts of the coast give, for the guidance of the sailor making a landfall, isobathic lines at depths of 30 and 60 fms., but these lines alone fail to delineate features of the terrace and the foreshore to which it is desired to call attention. By taking the numerous soundings given on the charts other isobaths of greater and less depths may be laid down, and although by the infrequency of the observations such are necessarily only approximately correct they are assumed, in the absence of more complete data, to be sufficiently near to have value in the present consideration.

The soundings on the charts thus used and the isobaths drawn they give to part of the region the appearance of a land surface depicted by contour lines an undulating surface with hills and hollows, ready formed for the flow of rills and rivers to the lower ground and there to join extensions of the present established water courses coming down from

what then would appear in relation to them as a high plateau. Much of the structure so defined suggests the features of lands carved by sub-ærial erosive agents and by them reduced to a peneplain. The character of the terrace is perhaps best pronounced if a depth of about 500 feet be selected as a one time shore line, and the sea be supposed drawn off to that depth or what would have the same effect, that the side of the continent had risen out of the water to that elevation above the sea level of to-day.

With a reconstructed shore at the depth named the physical features that would then exist appear more suggestive than perhaps at any other depth, although it is far short of the limit of elevation to which much evidence points as recently existing especially on the adjoining coast of Newfoundland.

Among the more marked features brought out by this assumed elevation of 500 feet is:— a large inland sea or lake with an outlet to the south. Then there are prominent extensions of existing promontories and headlines, islands large and small, plateaux crowned by knolls and bearing small lakes, a broad valley with a channel drained at that depth, broad estuaries to the main drainage system and, perhaps, some rocky peaks, river channels with sloping banks and islets, or with sides precipitous in places. Besides these, and even perhaps of more interest than all other features many deep isolated depressions often close to knolls of elevation above the average of the neighbourhood. Importance is attached to the seeming presence of these depressions and one of the main conclusions submitted in this paper is based largely on them.

To ships approaching Halifax from the southward the soundings supply but an imperfect guide to position, there is no gradual shelving of the sea bottom as the shore is approached, but great irregularity may be indicated by the lead. This condition though a source of anxiety to the navigator is one of much interest to the investigator of the structure of the country in prehistoric times. It is evident that the unevenness of the surface cannot be accounted for by ocean currents in one place piling up banks and in another digging out the holes and large depressions that exist, neither could the inequalities be explained by the action of icebergs, grounding, melting and depositing immense loads of earth and rocks, which by the way are rarely indeed borne by icebergs; nor is it possible to suppose that ocean currents could have formed channels which are brought into prominence on the reconstruction map; channels which in places widen out into broad valleys with gently sloping sides and elsewhere are narrowed with steep if not precipitous walls. Some other agents than these must be sought

to satisfactorily explain the features of the now submerged lands which in many respects bear strong resemblances to upland surfaces which have been moulded by the action of the forces of the atmosphere, frost and heat, wind and oxidation, rain and rivers.

It is therefore assumed that such indeed were the agents that determined the submarine surface, only that after submergence and after the forces of the glacial period had been spent the features became somewhat modified, by the mantle of sediment which denudation would cast into the sea and quiet waters would deposit.

Among the now submerged features of the region that may readily be recognized on the accompanying map are; a prolongation of Cape Canseau for 40 miles beyond its present terminus with deep water for half the distance on both sides;—Sambro with its ledges and islets protruding further southward; Not only was Scatterie island a promontory but it embraced Scattarie bank which lies 40 miles seaward of the present island. Sambro bank which is south of Halifax has steep sides and deep water about it. On the map it appears as an island and is probably of rock, a granitic mass, an under-sea extension of the rocks of Sambro thrust up between the slates of Halifax and St. Margaret's Bay. Possibly also some of the small islands that range in line across the Gully are rocky peaks, while those in the estuary of the streams that combined in Chedabucto Bay to flow eastward parallel to the Cape Breton coast are banks with no rocky nucleus.

It may well be asked do these features really indicate more than an accidental or fanciful resemblance to these which a sometime land surface would present under like circumstances; and are there any good reasons for assuming an elevation of serious moment has actually occurred in times comparatively recent? If the areas shown to be still depressed below the 80 fm. line are considered they will be noticed to have as it were channels proceeding from them to deeper water such as a land locked sea or great lake would require to carry off the surplus waters. Then, too, the seeming steep sides to the channels and the steep banks to the large island in the lake immediately south of Halifax can be explained only by assuming them due to erosion by subaerial agents, and for such agents to do their work it is essential that the area be well elevated above drainage level, not merely the 500 feet assumed for the drafting of this map, but to a much greater extent.

Another prominent feature which has long been recognized and accepted as proof of a previous elevation of this region is the broad and profound depression occupying the bed of the estuary of the St. Lawrence river, which sweeping south of Anticosti and north of Bird Islands

passes through the Cabot Straits between Cape Ray in Newfoundland and St. Paul's Island off Cape North of Nova Scotia. Continuing onward far out to sea for other 200 miles it divides the banks off the Cape Breton shores from those off the south coast of Newfoundland and until it reaches the deep water of the Atlantic.

How far up the St. Lawrence the depression extended is not known for the upper reaches are silted up with Pleistocene deposits but it evidently at one time drained the gorge of the Saguenay which soundings even now show to be 800 feet below the surface of the river. The magnitude of the stream must have been immense. In Cabot straits it has a width of 60 miles and a depth where narrowest of 1600 feet, and on issuing from between the Capes it expanded and against the Newfoundland shore cast up as by an eddy a bank or lisan of many miles in length.

In the embayment formed by the sharp turn which the edge of the continental shelf here takes between Cape Breton and Newfoundland the deeper bed of the valley contracted its width, and had at its exit into the abyss on the sides and directly in front shoals and bars which are fairly comparable with the lateral bars and the delta features of a flowing stream at its confluence with the sea. Can it be doubted that a depression so strongly defined and possessed of such suggestive features was once, as it has long been thought to have been, the bed of a great river that flowed along this course to the ocean and at a time when this part of the continent stood sufficiently elevated to enable the pebbles and silt of a flowing stream to erode the rocks in its bed. To effect this it may be taken as proven that the general level of the country must have then been not merely the 500 feet higher, as the map assumes, but probably was not less than 2000 feet or even 2500 feet greater than it is at present. It may even be questioned whether this latter elevation is sufficient to account for some of the conditions exhibited by the ancient river. When a stream enters the sea its current spreads out, its force is lost and it ceases to be erosive, its sediments in suspension are deposited about its embouchure in flats and bars and as a delta. Fluvial action is conclusive proof that the surface displaying it was at the time of activity above sea level. Where the 80 fm. line adopted on the map turns from the sea front into the river soundings show the ancient river bed at a depth of 2010 feet, but also seaward of the deposits about this neighbourhood, a greater bank lying at a still greater depth, even at 1500 fm. for a distance of 40 miles in the direction of an embayment still more profound. However, soundings in much of this region have been comparatively few and so far apart that

no satisfactory conclusions can be drawn of the presence or otherwise of a further eastward extension of the ancient river in times even more remote.

In a paper of mine read before this Society in May, 1903, a position was assumed for a tributary now submerged to this great river which must have drained the greater part of Eastern Canada in some preglacial age and when the region had greater altitudes than it has to-day. The tributary in question was located parallel to and but a few miles off the west coast of Cape Breton and its position was determined by laying down on Admiralty charts the isobaths indicated by the recorded soundings. The isobathic lines have also been extended further up the Gulf beyond Prince Edward and the Magadalen Islands to the shores of New Brunswick and they have shown other important tributaries flowing from the south had descended to the grand canyon of the Gulf of St. Lawrence into which opened a broad fjord parallel to the Gaspé peninsula. This had two branches represented now by the Bays Chaleur and Miramichi receiving then as now the main streams of Northern New Brunswick.

Besides the tributaries joining the preglacial river within the confines of the Gulf, others also flowing north and eastward fell into it south of Cabot straits. The drainage of the southern slopes of Cape Breton highlands formed a fjord similar in character to the one mentioned lying off the Gaspé peninsula. It had St. Ann's Bay at its head and was the outlet of streams finding passage northward by the Great Bras d'Or and Sydney harbour. Then there is the arm of the sea known as Mira river which is the head of another fjord but its mouth is obscure being partly silted up by the glacial deposits disturbed by the coastal currents which run so strongly by the projecting headlands of Scatarie and its neighbourhood. Still another stream of greater magnitude skirted the southern coast of Cape Breton and added its waters to the flood of the ancient St. Lawrence before it made its final plunge over the edge of the continent into the ocean's abyss. This stream came out of Chedabucto Bay then a profound fjord, as indicated by the deep soundings of 124 fms., and probably made its channel in Carboniferous strata, remnants of which are still left in Isle Madame, and along the shore and then followed eastward the present coast of the island, to join the great river near the Scatarie bank.

This fjord had two forks of which the smaller had its head in Roman Valley 10 miles above the town of Guysboro following the contact of two geological formations.

The northern or main fork is no longer fed by a stream of fresh water but now is occupied by the salt water strait of Canseau connecting the marine waters of the Gulf with those of the ocean.

The origin of the Strait of Canseau has been a subject of some speculation as a product of erosion in the comparatively recent Pleistocene period, but I ask consideration of a supposition that would make the origin of the strait a river channel in much earlier times when a course was found between the old rocks of Cape Porcupine and the Craignish hills of Cape Breton. Personally I am with those who hold that the erosion of the surface by the movements of an ice cap and its glaciers has been by some writers greatly exaggerated, and that in parts of Nova Scotia it was insignificant and insufficient even to rub off all the inequalities left by the preceding denudation effected by the agents of the air.

To account for the origin of the strait of Canseau by river action it is submitted that the deposits of the Permian and Triassic periods, remnants of which still occupy the Gulf, were subjected to the denuding influences of the atmosphere on their emergence from the sea during the Cretaceous period: That then the drainage from the northern slopes of the highlands along the range of the Cobequid hills and their extension to Cape George gathered near their base and forming a stream parallel to the general course of the hills found exit along faulting by the strait of Canseau to the sea. The deposits in Chedabucto Bay opposite the mouth of the strait take the form of a delta with water deeper on the sides than in the middle of the bay. The drainage of the hills flowed down their slopes until it met the new and less coherent beds and in them was made the lateral and combined stream. The present Northumberland straits were then part of the river system of this Cretaceous drainage. As time rolled on, and the newer rocks yielded more readily than the old to the action of the streams, the beds of the rivers in them deepened. The flow off the western slopes of the Cape Breton hills formed at first an independent river finding outlet to the eastward and eating deeper and deeper into the softer rocks, its forks and branches eroded backwards and at length cut through the barrier that divided it from some lower branch of the current flowing from the west round Cape George to the strait of Canseau. When this was once effected the deeper and swifter stream flowing by Cape Breton lost no time in making a way in addition for the waters of the stream thus cut off and which hitherto had gone south about to the ocean. Such a result of river action is no fanciful supposition but it is a recognized and accepted explanation by geographers for the presence of dry and unused channels of many existing streams.

This result achieved when subsidence in due course again lowered the region to sea level the remnant of the newer rocks lying north and

west of what had been Cretaceous rivers formed the island we have named Prince Edward and at the same time converted the valley, which first had been occupied by a fresh water stream, into a salt water strait. This at least is the explanation now offered to account for the phenomena presented by the region under review.

Mention has been made of two marked depressions breaking down the southern edge of the terrace; the Gully at the eastern end of Sable island, and Sambro valley the channel immediately south of Halifax. These localities seemed to be of such special interest that further information was sought for on board the cable-ship 'Minia' where a careful record is kept of depths, etc., at which repair and grapnel work is done. To Captain De Carteret and Mr. J. Adams, first officer who placed their local charts at my service I am greatly indebted. Special enquiry was made for soundings crossing the Gully's mouth, Long. 59° in Lat. $43^{\circ} 55'$ to $44^{\circ} 8'$ and there happily a record of grapnel work gave a depth of 847 fms. with so rapid a drop within a cable's length that as the ship drifted the grapnel could not be kept on the bottom. The drift was across the line of a narrow channel which the chart soundings had failed to disclose. The theory which I had presented to the officers of the cable ship had suspected the presence of an unrecorded deep channel and the record they had taken was fortunately able to confirm its existence. Could better proof of the value of the theory be obtained? Accident, however, did not lay so fortunate a course for the mouth of Sambro channel and desirable evidence of the conditions there is still lacking. Both valleys open to the south into bold water from which the deep water in the channels some ten miles up appears to be cut off and partially blocked by bars. The soundings along the Gully suggest, at spots steep slopes, islands, a winding channel and deeps contiguous to high points which remind one of cirques on the edges of plateaux.

The valley of the Gully connects with the deep water off Country Harbour and although an extension into that and adjoining fjords is now obscured by deposits and by the action on them of waves and currents towards the landwash.

The S.S. 'Minia' met with a condition off the Bay of Fundy somewhat similar to that at the mouth of the Gully, finding a submerged ravine over which a suspended cable was injured, presumably by chafing on the rocks as it was swayed by the tides.

Turning now to Sambro bank and its circumjacent valley the contours show that the bank is narrowest east and west and where its sides are steepest, and that it seems to be a continuation of the granite ridge

which lies west of Halifax Harbour and extends southward in Sambro ledges. Its crest comes within 47 fms. of the surface while about it is water exceeding 100 fms. in depth except to the north where it is separated from Sambro ledges merely by a narrow channel.

On its east side close to its base there is a depth of 153 fms. and the isobathic lines parallel its length with here and there a crest breaking an absolute uniformity.

Soundings exceeding 140 fms. extend for 40 miles giving direction of deepest water towards the north-east, with remains of lateral branches; while in the other direction towards the open ocean the bottom rises to 90 fms. and unless there be a narrow deep channel which as yet has not been recorded, the course of the ancient drainage is so dammed up that an elevation of 600 feet would make a large lake with Sambro bank as an island in the middle. The 'Owl' and other two small banks would make peaks above the surface of the lake. The structure of this valley suggests that the rocks here are slate and quartzite with foldings such as the operations of the gold miner have shown to be so regular on the land and made familiar to everyone. West of Sambro bank there is also water exceeding 130 fms. in depth, but the soundings indicate no such structure as that to the east of the bank and about Sable Island. Doubtless this condition of the seabottom may be accounted for by the strong flow of the currents of both water and ice under the influence of the great tide of the Bay of Fundy obscuring the older features.

That the Sambro valley was one of river erosion although its outlet is now closed, there can be, I think, but little doubt. The recent elevation and subaerial erosion of lands both east and west must have affected this region also, and explanation must elsewhere be sought to account for the mass of deposits that have closed the sometime outlet seaward of Sambro bank. The charts note several of the shallow soundings on the shelf as 'rocky,' these all lie within 40 miles of the coast, and many of the deeper depressions are marked as having a mud bottom. The inference from the exposure of the rocky peaks is that they were passed over by the deposit flowing from the land. The presence of mud in the deeper parts that there was there no indiscriminate dumping of moraine matter from ice, but the slow accumulation of fine sediment in quiet waters.

It is plain, however, that the preglacial features of the region can be surmised only in part, as they have been more or less covered over and disguised by later sediments. The bulk of these sediments appears to have accumulated towards the front of the plateau having here and there deep depressions between them and the shore. Ranging with the

deeps already referred to eastward of Sambro there are others of 150 fms. off Canso and off Gabarus. These soundings suggest that the plain of marine denudation that dressed off the continental shelf was at a depth exceeding that of 80 fms. below the foreshore of to-day and that it was formed before the great elevation that permitted the extensive river channelling we have been considering.

There are yet other features to be considered similar to some that are more pronounced on the shores of Newfoundland where the land is higher, the waters of the bays and fjords deeper, and the situation generally more like that of Labrador, and these will better illustrate characteristics to which it is desired to direct attention than their less prominent counterparts of Nova Scotia. Much of the coast of Newfoundland is deeply indented by fjords with narrow channels between steep walls and with bold water giving soundings deeper inside than in the open sea outside. Not only this, but what at first sight seems very remarkable soundings even sometimes deeper at the very head of the fjords than further out. Of the origin of these deep indentations there can be no doubt it is due to the same causes that produced the fjords of Norway and Greenland, to the erosion by sediment in moving water and ice, to streams descending from the high table lands at a time when the whole country stood far above the present level and when it was elevated sufficiently to allow the rivers to cut their beds 2500 feet at least below the sea level of to-day. Then followed a period when glaciers occupied the river valleys and ravines and stretched seaward beyond the present coast line. To recognize these features it is only necessary to study the charts of the coast, take almost any ravine and it will supply an illustration: Conception Bay shows soundings down to 143 fms.; La Poile to 150 fms.; Harbor Breton to 169 fms.; Belle Bay out of Fortune Bay to 299 fms.; and Hermitage Bay to no less than 390 fms., or 2340 feet of water, while outside the headlands in the open sea the usual depth of water does not exceed 100 fms. The conclusion is inevitable that the fjords were first carved to the greater depths and afterwards had their outer channel choked by deposits. It will further be noted that where bold water approaches close to the cliffs it is always on the west side of the bays, the side from which glaciers would descend from the ice sheet on the high plateaux. To account for the deepest water occurring at the head of some ravines it is surmised that they were occupied by the glacial ice when the moraine matter was carried forward and deposited in the channels further out and there shallowed the waters. Then when later the ice age passed away and the glaciers melted the parts they occupied were free of drift and are now represented by deep holes and depressions occupied by water. In the same way were made what are

known as kettle holes in the moraines, the site of stranded blocks of ice among the terminal deposits.

It is also surmised that the ice sheet was general not only over the whole island but that it extended, across the straits from Labrador moving eastward to the open sea and carried with it immense quantities of detrital matter which were deposited over the area we know as the Banks, the great fishing ground of Newfoundland. At the period of elevation the continent, no doubt, extended to the eastward and included the area about the Virgin rocks and the Eastern shoals, the extreme gathering ground for the glacial drift carried and pushed eastward by the Banks, the great fishing ground of Newfoundland.

Reverting again to our own shores fjords are nearly as much in evidence as they are in Newfoundland though they have not the same depths of water. A few exceptional depths are, however, reported. Close to Canseau Harbour in Chedabucto Bay there is a deep giving 124 fms.; inside the Little Bras d'Or another showing 114 fms., and the centre of Bedford Basin has a sounding of 220 feet. A depression which was occupied by ice while the glacier was in motion that brought to the Atlantic drift from the north Mountain of King's County. A glacier that formed the ground moraines of McNab's and George's Islands in the main harbour of Halifax and which deposited drift against an ice front that extended down into the water at Purcell's Cove.

Here is an excellent local illustration on a small scale of that remarkable feature, prominent in some Newfoundland fjords where the water is shallower outside than at the head. At Purcell's Cove the drift was so piled up against the ice front as to form a small and secure harbour and leave an island when the ice disappeared. It has made of that locality a charming resort for people from the city in which to spend a summer holiday.

These references to the ice age all point to the important part played by glacial phenomena in shaping the configuration of the submerged platform. Prior to which epoch the harbours, estuaries and bays of the south shore had taken shape and influenced direction to the seaward flow of all the drift to the east of Shelburne where the more powerful stream of ice in the Bay of Fundy drew with it much of the ice along its shores and so deflected the general course of the flow from east of south to westward of the meridian. The striae grooves and kames of the western part of the province point to this conclusion. The courses of the preglacial river channels below the foreshore though generally obliterated by littoral deposits are here and there exposed.

Mr. Prest notes the exposure of a narrow and deep channel of tortuous course walled by Cambrian slates that extended from the mouth of

Musquodoboit river through the harbour of that name, and its flats to the sea, and he refers to the La Have, East and Sutherland's rivers as also showing their ancient but now submerged extensions under the sea. (Vol. VIII., Pt. 2, p. 146.)

Dr. Ambrose, Vol. I., Pt. 4, p. 33 of the Nova Scotia Instit. of Sc. Series, describes the trough in St. Margaret's Bay which fishermen call the 'hospital,' a mud covered ravine about 50 yards wide, 20 yards deeper than the rocky walls which run parallel to the shore off Peggy's Cove and opens into a similar channel running up the bay. He also speaks of the Inner and Big Gulches both bottomed with black mud the former a mile long and 60 fms. wide, the latter three miles long and 100 fms wide. These like the submerged channels mentioned by Mr. Prest were probably occupied by ice when the glacial drift was carried over them further out to sea.

Dr. D. Honeyman refers shortly to the view of Sir J. W. Dawson and of himself on the position of the terminal moraine of the Ice Age and to the formations to which belong the various boulders and pebbles brought up by the lines of fishermen on the banks in waters 60 to 80 fms. deep.

In Vol. VII., p. 211, he contends also that glacial transportation did not extend beyond Thum Cap at the entrance of Halifax Harbour.

Mr. W. Upham in his paper on The Fishing Banks, 1893, p. 47, includes those off Nova Scotia but he does not deal with details respecting them. He speaks of rock specimens obtained on the banks and seems to have accepted the views of Professor Verril, whom he quotes, as being of opinion "on examination of the specimens brought up from the banks by the lines of fishermen that they have been detached from a very extensive submerged Tertiary formation at least several hundreds of miles in length, extending along the outer banks from Newfoundland to Cape Cod, and perhaps constituting a large part of the solid foundation of these remarkable submarine elevations." He further expresses belief that the fossils in some of the specimens are probably Pliocene, the age, according to Mr. Upham, "of the strata which beneath a thin envelope of glacial drift form these submarine banks." On the other hand Dr. Honeyman points to boulders of limestone got in 65 fms. off the Nova Scotian coast as suggestive of a base of Carboniferous age to the banks. All, however, are agreed, as taught years ago by Professor Agassiz, that the fishing banks are at least superficially covered by a continuation of the deposits forming the terminal moraine to the ice sheet of New England and Canada. Whether the superficial deposit is only a thin envelope, and the detached fossiliferous rock fragments of a local deposit of a previous age and not of detritus brought in glacial times or more

recently on ice floes, may be questioned. In Greenland fossiliferous beds of Tertiary age have undergone extensive disintegration and are to-day within the active range of glaciers and shore ice that carry detritus southward to be dropped on the melting of the ice. To accept a conclusion which regards Tertiary fossils obtained on the Fishing banks as derived from local beds of that age necessitates the absence of terminal moraine material which, however thin, would prevent the fishing lines from reaching and bringing specimens to the surface.

Assumptions have already been quoted that the shore deposits are the remains of the terminal moraine of the glacial flows in the Pleistocene period, but consideration makes it doubtful if the deposits so exposed are of that character, in extent they do not compare with those to the west of the Bay of Fundy and are no more extensive than some of the drumline mounds occurring inland; for instance some in Pictou county were proved to be over 80 feet in thickness, and by the Miramichi river the explorations for the Chatham water-works showed gullies leading into that stream to be filled with boulder clay to the depth of 100 feet below the present water level.

The proposition is submitted that instead of the ice front stopping at the shore it was pushed forward on the terrace in range with Sambro bank and deposited much of its load seaward and even to the edge of the shelf and in proof of this attention is directed to the deep holes of circumscribed area that the soundings disclose and which remind one strongly of the kettle holes of moraines. Then, again from the sands of Sable Island the seas sort out on the beaches the fine grains of black cres of iron and red garnets identical with similar deposits on the shore of Lake Ontario that are contained in the glacial drift from off the Azoic rocks to the northward. The Sable Island deposit it is contended had a similar origin and necessarily from the nearest source the mountains of Labrador.

It is inconceivable that ocean currents could have carved out a sea bottom of the complexity of contour here developed. In shallow waters the ebb and flow of tides may show a tendency to make channels, but the usual effect is to level down and round over mounds and inequalities of deposition. Then as to icebergs of large dimensions being the vehicle, none are known to come near to Sable Island to be stranded and to furrow out depressions even if they could reasonably be regarded as the possible graving tools of the sea bottom.

In a consideration of this kind we are hampered by inability to see the deposits in place, to dig into and find the composition and thickness of the various deposits and to separate those that are superficial and to which accretions are now making from the older sediments resting on a

rocky base. All we do know by the soundings and dredgings is of the material resting on the sea bottom whether it be of mud, sand, gravel, boulders, clay or rock. What we would like to know in addition is whether the samples obtained are strictly superficial or from a substratum not now subject to accretions. Much therefore is still conjectural respecting submarine conditions and reliance has chiefly to be placed on seeming analogy to land structure.

In the case of the Banquereau, Sable Island and other fishing banks lying off Nova Scotia, we have to ask ourselves, can they possibly be the product only of material dropped by ice floes and bergs borne south by currents from northern regions? If the answer be in the affirmative would it not be reasonable to expect an average uniformity in the resulting layers with a tendency to parallel the course of the flow? But the conditions really found are great irregularity in the depth, direction and quality of the deposits and no indication of deposition by currents below the effect of wave action. It is hence assumed that whatever additions have been made to the banks by ice carriage they have had no important bearing on the configuration of the sea-bottom. Moreover the evidence of those who frequent these latitudes is that the set of the Labrador current is not over these banks, and further, that bergs rarely are seen bearing earth and stones, and again, that much of the melting of the bergs in the open sea occurs off the banks.

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APPENDIX.

In the description which followed upon the reading of this paper Dr. L. W. Bailey called attention to the facts which both in New Brunswick and Nova Scotia indicate the former higher elevation of the Acadian region in pre-Glacial and Glacial times.

As regards New Brunswick this is indicated not only by the extension of the channels of the St. John and other rivers debouching into the Bay of Fundy, as indicated by soundings and the arrangement of isobaric lines upon the north side of depression, but also by the fact that the present river St. John, as indicated by the depth of the Pleistocene clays at Fredericton, eighty miles from the mouth, is flowing at a level at least 200 feet above its former rock bottom, and again by the fact, recently pointed out by Prof. Ganong, that the streams which drain the eastern sea-board of New Brunswick at one time extended across Northumberland Straits and were coincident with the more marked valleys now indenting the coast of Prince Edward Island, these being tributary to the main channel of the St. Lawrence then traversing the entire length of the latter.

In Nova Scotia like conditions are indicated by the fiord-like irregularities of the present southern or Atlantic shore and of its submerged platform, as indicated by Prof. Poole, but also by the evidences of unusual glaciation there exhibited, as shown by the character and extent of the moraines, eskers and kames met with, and especially the size and depth of glacial troughs, which, in some instances, traverse the hard quartzites of the Cambrian system with a depth of not less than twenty feet! Photographs of the latter were exhibited to the members of the section.





IX.—*The Distribution of Lactic Acid Bacteria in Curd and Cheese of the Cheddar Type, with Nine Illustrations from Photomicrographs.*

By F. C. HARRISON, The Macdonald College, Ste. Anne de Bellevue, P.Q.

(Communicated by Dr. James Fletcher, and read May 23rd, 1906.)

Mme. Troili-Petersson and Gorini in 1903 and 1904 published papers on the distribution of bacteria in Güter and Grana cheese, and employed and advocated histological methods of preparation and section cutting for this purpose. Recently Rodella again called attention to the value of these direct microscopical preparations, and his paper on account of the omission of Mme. T. Petersson's name in the historical resumé of the subject has already called forth replies regarding priority of publication. Hence it seemed opportune to publish the results of some work along the same lines as the above mentioned investigations, but with Cheddar cheese of the Canadian type instead of the varieties already investigated.

Gorini in a footnote to his paper, referring to a previous investigation published by Connell and myself stated that we suspected the uneven distribution of bacteria in Cheddar cheese, without however, giving any demonstration of it. This is correct so far as a direct examination of sections from cheese is concerned but we give in the paper referred to several very good examples of the results of numerous quantitative analyses of Cheddar cheese which showed conclusively that the bacteria were unevenly distributed not only in normal cheese but abnormal cheese affected with the well known gaseous fermentation and we concluded the paragraph as follows: "These examinations, which are typical of many others which we have made show there is not an even distribution of bacteria throughout the substance of a cheese, and it would therefore, seem necessary to modify somewhat our methods of analysis" a conclusion to which Gorini also arrives at in his paper "Cette distribution irrégulière des bactéries augmente les causes d'erreur dans l'analyse bactériologique quantitative du fromage."

These results have been confirmed by the histological investigation of several cheese made according to the well-known Cheddar method.

Methods of Imbedding.—Several methods were tried, of these, paraffin with oil of bergamot as a clearer gave the best results; good results were also obtained by using chloroform as a clearer. Celloidin gave inferior results, although the pieces of curd or cheese were passed through 2, 4, 6, 8, 10 and 12 per cent solutions of celloidin.

Section Cutting.—Sections were cut with a good microtome, transferred to warm water and then floated on to cover glasses. These preparations were placed in a thermostat at 37°C. until all water had evaporated.

Staining, etc.—The paraffin was dissolved in xylol; the sections were then passed through graded alcohols and stained by various methods. The method which gave the best results was the ordinary method of Gram, counter staining with eosin. This gave beautiful preparations, the lactic acid bacteria, yeasts and torulæ being well demonstrated, and I should like to call attention to this method as a means of differentiating certain classes of micro-organisms in cheese. Bacteria of the colon type decolorise by this method, but may be stained by using Bismarck brown as a contrast stain. Such preparations whilst useful for study purposes were of no use for photographic use as the cheese or curd substance accepted the brown stain too deeply. By following Gram's method but using amyl alcohol for decolorising and dehydrating all bacteria were stained. Leucocytes in the cheese are often very numerous and as usual were beautifully stained by Gram's method.

The sections were always cleared in oil of cloves, and mounted in Canada balsam.

Samples of the curd at various stages of manufacture were taken, as well as of cheese taken from the presses, and small pieces were placed in 95% alcohol, imbedded in paraffin, sectioned and stained according to the methods already given. In order to intelligently follow the results of this work, a few explanatory notes are necessary as to the method of manufacture of Cheddar cheese. The milk is heated to 86°F (30°C) and when the desired acidity in the milk is obtained, which is usually done by adding 0.5% of a culture of a lactic acid bacillus, enough rennet is added to coagulate the milk, fit to cut, in 15 to 20 minutes. This point is referred to as "cutting time." The curd immediately it is cut is stirred by means of agitators for 10 to 15 minutes and then the vat is carefully heated to the cooking temperature of about 98° to 99°F (37° to 38° C) in one and one half hours from the time of adding the rennet. This point is referred to as "When cooking temperature was reached." As soon as the acidity of the whey reaches 0.17 to 0.2 the whey is either run off or else the curd is dipped out and removed to a special rack. This point is termed "At dipping." The curd is then stirred, piled about 8 inches high and allowed to mat together. When it is well matted together the piece is cut into strips six to eight inches wide and turned upside down, and in about 15 minutes time it is again turned and piled two deep. This turning and piling is continued every fifteen minutes until the curd is ready to mill, which the cheese maker judges by

its flaky consistency and the development of .7 to .85 per cent of acid in the whey which drains from the curd. The curd is then put through a mill which cuts it into small pieces. This point is referred to as "Milling time." The cut pieces of curd are then stirred frequently to prevent them matting together, and when the curd has mellowed and the dripings of whey shew from 1.0 to 1.2 per cent of acid, salt is added at the rate $1\frac{1}{2}$ to $2\frac{1}{2}$ lbs. to the 1000 lbs. of milk. This is referred to as "Salting time." The temperature of the curd from dipping to milking is about 94°F (34°C). After milling, the curd is allowed to cool gradually to about 85° F (30°C) and it is put into the presses at a temperature of 82° to 84°F (28°-29°C). The cheese is turned once and kept in the hoops overnight, afterwards it is removed to the curing room.

Microscopical Examination of Curd and Cheese at Different Periods.

1. *At Cutting.*—Sections shewed the cheese to have a granular structure with numerous clear spaces. The lactic acid bacilli occurred singly, in pairs or in small groups of 5 to 10 cells, they were not numerous, twenty to thirty fields (using the 1-12th oil immersion lens) were often searched before any organisms were seen. See Fig. 1.

2. *When Cooking Temperature was Reached.*—There was no noticeable difference in the open or closeness of texture of the curd. The bacteria were about the same in number as at cutting time, but now and then larger groups were present. See Fig. 2.

3. *At Dipping.*—The texture of the curd was slightly coarser, and there was a noticeable increase in the number of bacteria, nearly every field of the 1-12th oil immersion lens shewed bacilli, many in short chains or clusters, and here and there small clumps or colonies containing from 20 to 100 cells. See Fig. 3.

4. *At Milling.*—The texture of the curd has undergone considerable change, instead of the granular texture it has now become quite flaky, giving the appearance of layers or laminæ closely pressed together. (See Fig. 4.) When this stage is reached cheese makers term the curd "meaty" and it can be torn into long flaky strips. It was almost impossible to find a single field in which there were not large numbers of bacteria. The increase in numbers since dipping time was very marked. The bacilli occurred in small chains and in small and large clumps or colonies. See Fig. 5.

5. *At Salting.*—The texture of the curd was not so markedly flaky.

The bacteria increased in numbers, larger clumps were seen,—some very large ones near the open spaces in the cheese. See Fig. 7. A

micro-photograph of lower magnification shews the enormous number of bacteria present and clumps, or aggregations of bacteria of various sizes.

8. *Cheese two days old*.—Little change has occurred in either the texture or numbers of bacteria present, since the salting stage. Fig. 8 shews a large mass of bacteria around an open space in the cheese and Fig. 9 of lower magnification gives a good idea of the distribution of the bacteria in the cheese.

The starter or pure culture used in the manufacture of this cheese, was a lactic acid bacillus which grew in small chains, and it could be quite readily recognized in microscopical preparations of either butter or cheese, made from cream or milk in which it had been introduced, as the lactic acid bacteria naturally present did not form these characteristic chains. It was always easy in this particular dairy to distinguish the dairy products in which it had been used from those made from natural ripening.

Conclusions:—

1. The paraffin imbedding method, as already outlined gives excellent results in the preparation of curd or cheese for microscopical examination.

2. Gram's method of staining, with eosin as a contrast stain brings out the lactic acid bacteria, yeasts, and torulæ or all organisms which are known to accept this stain and hence this method of coloration has some diagnostic value.

3. Organisms in curd or cheese which do not accept Gram's stain may be demonstrated by the use of Bismarck brown.

4. Practically all bacteria are stained if amyl alcohol is used for decolorising or dehydrating.

5. The lactic acid bacteria increase very rapidly in numbers from the time the rennet is added to the milk until the time of salting.

6. The increase in numbers of these bacteria from the time of salting until the cheese is a day or two old is not very pronounced. Comparison, however, is difficult on account of the huge numbers present.

7. The lactic acid bacteria have a tendency to form clumps or colonies of various sizes. Over a thousand cells have been counted in a single clump or colony.

8. The results confirm the quantitative analysis of curd and cheese by the plate method, and the amount of acid developed in the whey during the progress of making is an indication of the extraordinary multiplication of the lactic acid bacteria present in the curd.

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Illustrations:—

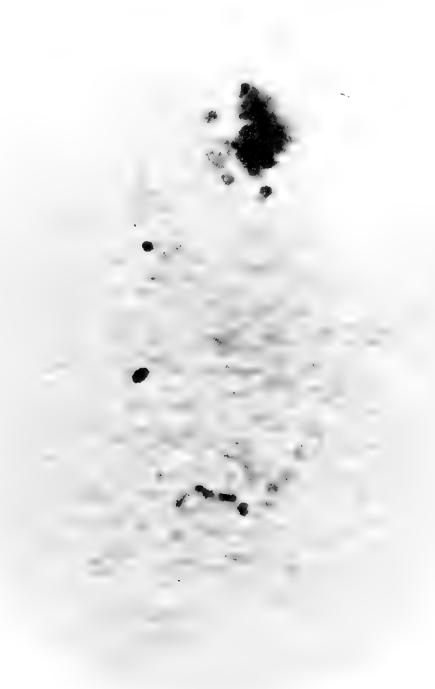
The photo-micrographs were taken with a Zeiss apparatus, 2 m.m. oil immersion objective and compensating oculars. All sections stained by Gram's method, with eosin as a counter stain.

1. Section of curd obtained at cutting time. x 1200.
2. Section of curd obtained when cooking temperature was reached. x 1500.
3. Section of curd obtained at dipping time. x 1500.
4. Section of curd obtained at milling time. Observe the flaky character of the curd substance. x 1500.
5. Section of curd obtained at milling time, colony or clump formation. x 1500.
6. Section of curd obtained at salting time. x 1500.
7. Section of curd obtained at salting time, observe the large numbers of organisms and the formation of colonies. x 500.
8. Section of cheese two days old. A characteristic colony. x 1500.
9. Section of cheese two days old, observe distribution and colony formation. x 500.



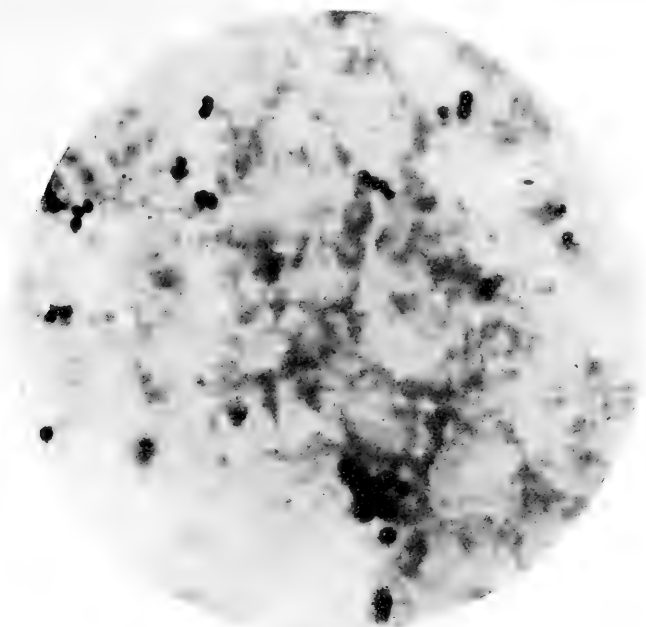


1. AT CUTTING TIME. x 1200.

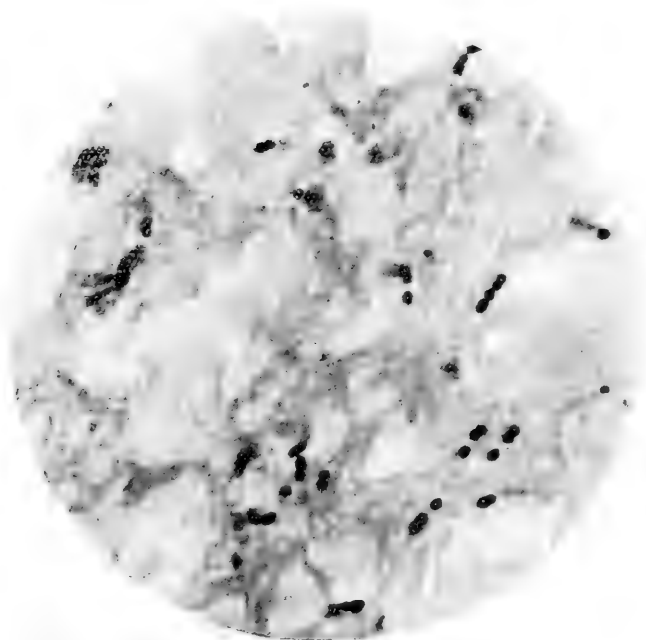


2. WHEN COOKING TEMPERATURE WAS REACHED. x 1500.

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3. AT DIPPING TIME. x 1500.



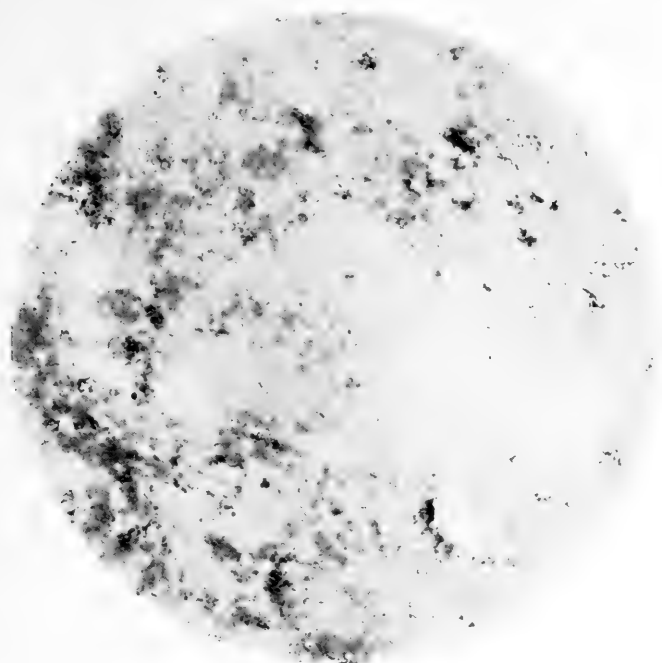
4. AT MILLING TIME. x 1500. NOTE FLAKY NATURE OF CHEESE.



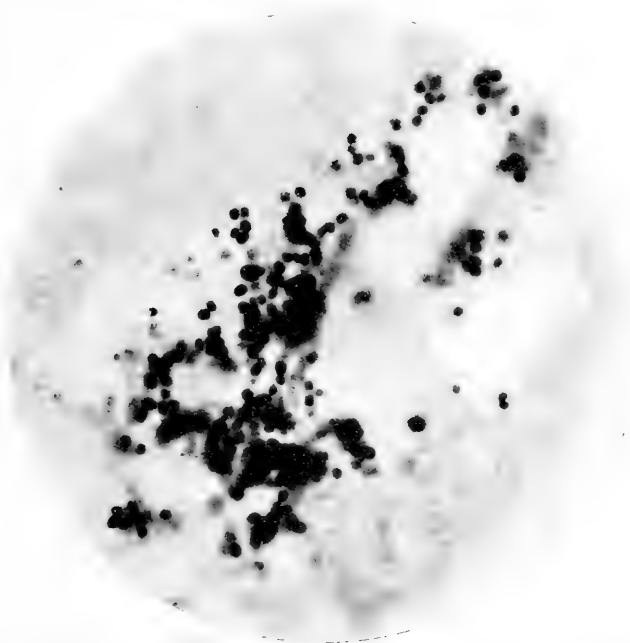
5. AT MILLING TIME. x 1500.



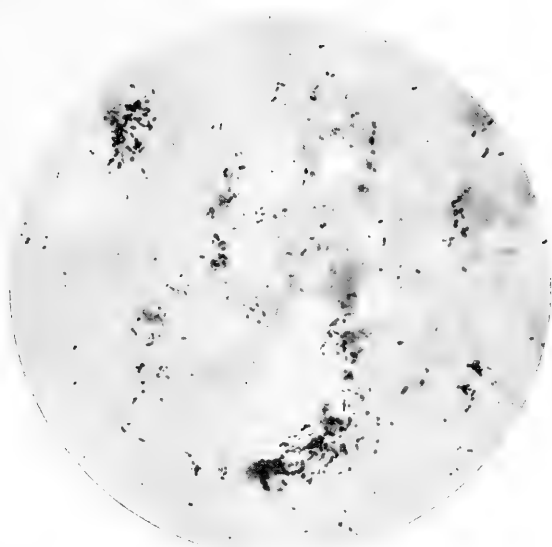
6. AT SALTING TIME. x 1500.



7. AT SALTING TIME. x 500.



8. CHEESE 2 DAYS OLD. A CHARACTERISTIC COLONY. x 1500.



9. CHEESE 2 DAYS OLD. x 500.

X.—A Review of the Flora of the Little River Group.

By G. F. MATTHEW, LL.D., D.Sc.

(Read May 22nd, 1906.)

The writer proposes to give in a series of articles to be read before this Society the result of a review of the plant remains of the Little River Group, a series of strata in southern New Brunswick that have been referred to the Devonian Age. The examination will include a revision of the types of this flora that were returned to the cabinet of the Natural History Society of New Brunswick by Sir J. William Dawson, types collected by the late Professor C. F. Hartt, in 1862-4, and by the author at that time and since, as well as new material collected by Messrs. W. J. Wilson, G. Stead, Wm. McIntosh and A. G. Leavitt. This new material it is hoped will give additional knowledge of this ancient flora.

The need of a re-examination of these plants is forced upon us, not only by the changes in nomenclature that have been accepted since Sir William wrote his classic essays on this subject, but also by the fact that eminent palaeobotanists have questioned the reference to these plants to the Devonian Age, and have asserted that they were Carboniferous.

The writer does not propose to take up at present the stratigraphical evidence upon which is based the reference of the terrane which holds these plants to the Devonian age, but only to study the plants themselves, and as far as possible note the beds from which they have come; the determination of their exact geological age may be left to a later occasion.

It was in connection with the labelling and arranging of the types of this collection returned by Sir William to the Natural History Society of New Brunswick, that this revision was found to be necessary. In the arrangement made when Sir William undertook the study of these plants, one set of the types is preserved in the Museum of McGill University, and the other in the cabinet of the Natural History Society of New Brunswick; duplicate types of some of the species are also in the author's cabinet.

Since Sir William's work was performed on these plants new species have been found in these beds, including some novel types of the Calamaria and the Ferns. These will be described and figured in

this series of articles, and the writer hopes may prove of interest to palæobotanists.

The terrane in which these plant remains are found is believed to cover a considerable interval of geological time, and not to be confined to the Middle Devonian as many have been led to believe from Sir William's determination of the flora; it should not be overlooked that the plant remains determined by Sir J. William Dawson were collected from about 140 feet of measures of a terrane thousands of feet in thickness; and, while species of plants like *Calamites Suckovii* occur through a thickness of 400 feet or more, there are others that are confined to special portions of the plant beds; and it is these species which give character to the flora.

HARTT'S SECTION.

It is somewhat unfortunate for our present purpose of studying the vertical distribution of the species of plants in the terrane of the Little River Group, that Sir William Dawson has not indicated the special beds at the Fern Ledges, etc., from which came the species that he has described. This may have been because Professor Hartt had not marked the specimens which he collected in such a way that this could be done.

It has thus happened that while the bulk of the flora can be placed in relation to the beds from which the specimens came, a number of species, not described nor named at the time that Professor Hartt made up his list, can only tentatively be assigned to certain beds.

The following table will show the range of the Equisetales in the beds of the sections at Bay Shore, as far as it is at present known. It is partly compiled from Professor Hartt's notes in the Acadian Geology, pp. 516 to 523, and partly from the observations of other collectors who have been to these localities in later years. The three subfloras which appear to be present are indicated. A higher subflora appears to exist in the Upper Cordaite shales (Murphy's Point, etc.), but its plants are poorly preserved and Equisetales are rarer there.

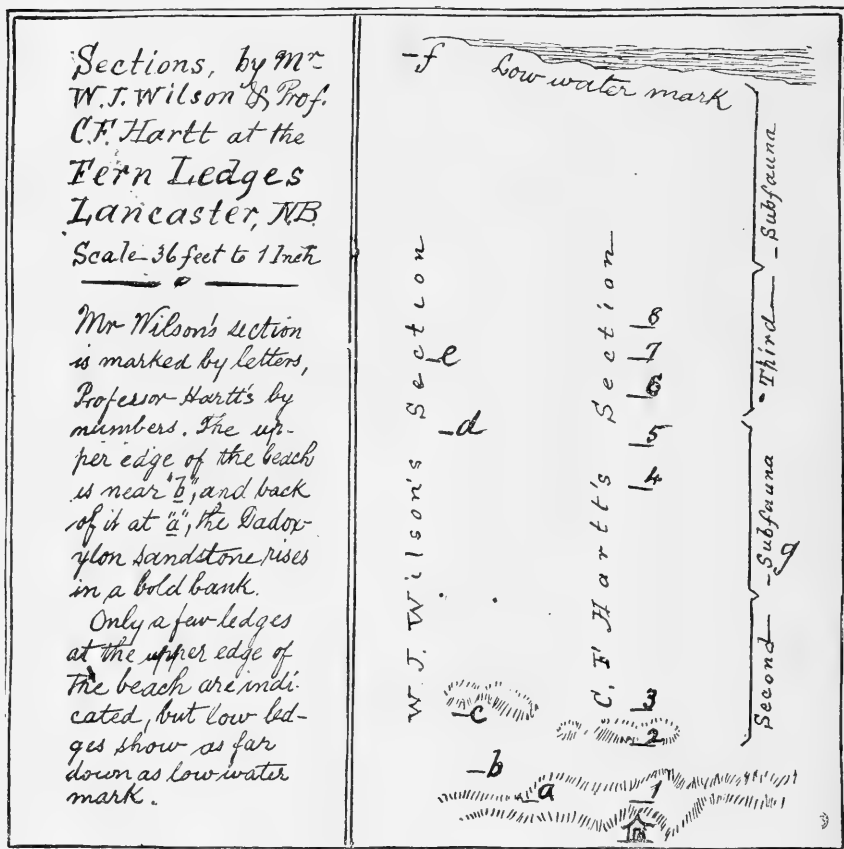
Distribution of the Equisetales in the Plant Beds at Lancaster (or Bay) Shore, St. John, including Hartt's Section:

	Dadoxylon Sandstone					Lower Cordaite Shale								
	First sub-flora					Second sub-flora					Third sub-flora			
	1	2	3	1 Hartt 4		2	3	4	5	6	7	8	f	
<i>Calamites cannaeformis</i> , Schloth.....			?			x								
C. ——— <i>Suckovii</i> , Brong't.			x			x	x				x	x		
C. ——— <i>geniculosus</i> , n. sp.....											?			
C. ——— <i>Cistii</i> , Brong't, mut.....		x				x					x			
<i>Asterocalamites scorbiculoides</i> , n. sp.		x		x		x	x	x			x	x		
<i>Ramicalamus dumosus</i> , n. gen. & sp.	x			?										
<i>Lepidocalamus scutiger</i> , Dn. sp.....				x		x	r							
<i>Asterophyllites longifolius</i> , Sternb....		x		x		x					x			
A. ——— <i>fasciculatus</i> , n. sp.....											x	x		
A. ——— (?) <i>fissus</i> , n. sp ..											x	x		
A. ——— <i>lentus</i> , Dawson.....						x								
A. ——— <i>parvulus</i> , Dawson.....				x										
A. ——— var.....						x								
<i>Annularia longifolia</i> Brong't, mut } Leavitti, Matt.		x												
A. ——— <i>latifolia</i> , Dawson.....				x ?		x	x							
A. ——— <i>latifolia-minor</i> , n. var.....				x										
A. ——— <i>acicularis</i> , Dawson.....				x		x		?			?	?		
<i>Polystachia acicularis</i> , n. sp.....						x								
<i>Annularia recurva</i> , n. sp.....						x								
A. ——— (?) <i>ligata</i> , n. sp ..						x								
<i>Sphenophyllum antiquum</i> , Dn.....				x		?								

WILSON'S SECTION.

Hoping to obtain more exact information as to the location in the section at Fern Ledges of the species described by Sir William Dawson, I wrote to Mr. W. J. Wilson who, several years later, had collected at this locality, for information on this point, and he very kindly responded with notes and a section made from memory. This section is so strongly confirmatory of that of Hartt, that I give it with the notes on the species collected, and Mr. Wilson's notation of the beds by lettering.

Mr. Wilson's notes are as follows (see the ground plan herewith of his section):



a. Plant Bed a short distance east of Demill's summer-house and high up on the bank. A rather coarse sandy shale containing an abundance of *Asterophyllites* (now *Annularia*). This rock does not split evenly. It contains beautiful whorls of *Annularia*, and this is the only plant remains I remember finding in it, but there may have been others, as I did not keep a record of the plants from each bed. [This is Hartt's bed No. 1. G. F. M.]

b. Not far below highwater and east of the summer-house a bed containing plants similar to those in Hartt's bed No 1. This bed is often covered with gravel, which is moved about in large volume by the tide, especially in storms. [N.B.—There is a fault east of Hartt's section, on the eastern side of which fault the measures have been moved southward, so that the bed *b* may be of the same group with Hartt's bed No. 1, and so belong to the Lower sub-fauna. G. F. M.]

c. This is probably Hartt's No. 2, and is one of the most prolific beds in the series. Where I worked it the shale is of a dark colour and very fissile and rather soft. It is, or rather, was, worn down to the level of the beach, but I was able to follow it for twenty or thirty feet east and west. *Sphenopteris marginata* is very abundant, also *Neuropteris polymorpha*. Besides these which were so common, I found nearly all the plants mentioned in Hartt's list. I remember some excellently preserved specimens of *Psilophyton glabrum* and *Cordaitea Robbii*.

Then follow some small beds which showed occasionally after heavy storms, by which some new spot was laid bare, from which I collected several species, as *Neuropteris polymorpha*, *Cordaitea Robbii*, the two *Calamites*, *Sphenopteris marginata*, *Pinnularia dispalans*, *Psilophyton elegans*, *P. glabrum*, *Cardiocarpon cornutum*, and *Sporangites acuminata*, and other fruits.

d. About half way down the beach, between high and low water mark I found a greenish shale which contained a beautiful frond of *Pecopteris*. We thought the fern new at the time, but Dr. White says it has been described; I have forgotten the name of the species but it is a *Pecopteris*. The bed is only two or three inches thick. It is the only place where I found this fern. *Megalopteris Dawsoni* is, I think, between c and d, and not far from d.

e. A few feet above the last bed (d), that is down the beach, and nearer low water, there is a somewhat hard layer containing very large specimens of *Cordaitea Robbii* in great abundance. This bed also contains *Neuropteris polymorpha*, *Calamites*, sp. and *Alethopteris discrepans*.

f. Near low-water mark there are some beds worn to near the beach level, rather hard and not very fissile, which break somewhat irregularly, and show slicken-sided surfaces, that contain very good specimens of *Alethopteris*, usually a single large leaf.

Of this section Mr. Wilson writes me that he has had to depend on his memory, as he made no exact record of the species from each bed when collecting.

On comparing the two sections, Hartt's and Wilson's, there seems no certainty that Mr. Wilson collected from the upper sub-fauna, except the specimens he may have taken from the bed f; and except the *Alethopteris* from that bed, the species he cites from his upper beds are such as have a wide range and are not necessarily of the upper sub-fauna.

The bed marked *g* on the plan is inserted in Mr. Wilson's section, but he does not name any fossils from it; it probably contains plants of the middle sub-fauna.

EQUISETALES.

In this article the author has taken up only the plants allied to the modern horsetails. They present a variety of forms most of which, like those of the Coal Measures are giants compared with their modern representatives. The fossils are not all hollow reeds like the Calamites, but some had solid stems, that were able to resist decay and compression for a considerable time and hence are found penetrating several layers of sediment.

The leaves of these plants are found in great abundance in some layers, sometimes they occur detached, but in other cases are attached to small branches on which they grew. Occasionally these branches and the leaves are found attached to the main stem, showing the over-ground parts of whole plants. The roots also in some cases are found attached; some of these come under the generic name *Pinnularia*, and others present a surface somewhat like the stem of *Lepidodendron*. These roots will be taken up in the next article.

The Equisetales of the Little River terrane while they contain many plants of Carboniferous aspect, have others of a peculiar type, and their more striking differences, those that seem most primitive, may be stated as follows:—

- | | |
|---|--|
| 1. Plants with solid stems and whorls
of leaves between the nodes.... | } <i>Ramicalamus</i> , n. gen.
} <i>Lepidocalamus</i> , n. gen. |
| 2. Plants with solid stems, whorls of
leaves only at the nodes..... | } <i>Annularia</i> .
} <i>Asterophyllites</i> .
} <i>Sphenophyllum</i> . |
| 3. Plants (as preserved) with hollow,
channelled stems, leaves in whorls | } <i>Asterocalamites</i> .
} <i>Calamites</i> . |

The several genera show the following distinctions among themselves in respect of the whorls of leaves and the stem:—

Ramicalamus, n. gen.—whorls of leaves clustered near the nodes, leaves persistent.

Lepidocalamus, n. gen.—whorls spread along the stem, those between the nodes deciduous or caducous.

Annularia—whorls at the nodes, usually flattened to the plane of the stem, possessing an annulus.

Asterophyllites—whorls spreading or ascending, annulus absent. Sec. 1, the leaves evenly spread around the axis. Sec. 2, leaves in tufts around the axis.

Sphenophyllum—leaves few, with spaces between at the node (like the above Sec. 2 of *Asterophyllites*).

Calamites—stem (as preserved) fistulous, and having ribs alternating at the nodes.

Asterocalamites—Stem (as preserved) fistulous and having opposite ribs at the nodes.

The following species of these genera are described in this article:—

Ramicalamus dumosus, n. sp.

Lepidocalamus scutiger, Dn. sp.

Annularia longifolia Brongt. mut. Leavitti, n. mut. *A. latifolia* Dn. and var. minor n. var. *A. acicularis*, Dn., *A. recurva*, n. sp. *A. (?) ligata*.

Polystachia acicularis, n. sp.

Asterophyllites longifolius, Brongt., *A. fasciculatus*, n. sp; *A. (?) fissus*, n. sp., *A. lentus*, Dn., *A. parvulus*, Dn.

Sphenophyllum antiquum, Dn.

Calamites connæformis, Schloth., *C. Suckovii*, Brongt., *C. Cistii* Brongt. mut., *C. geniculosus* n. sp.

Asterocalamites scorbiculoides, n. sp.

DESCRIPTION OF SPECIES.

CALAMITES *Suckovii*.

CALAMITES *CANNÆFORMIS*, Schloth.

Schloth. *Petrefactenkunde*. p. 398, pl. XX, fig. 1.

Brongt. *Hist. d. Végét. Foss.* p. 131. pl. XXI.

Dawson, *Fossil plants Dev. & U. Sil. Can.* p. 26, pl. IV, figs. 47, 48.

Lesq'x, *Coal Flora of Penn.*, p. 24, pl. I, fig. 1.

In the material referred by Sir William Dawson to this species I find many examples that agree better with *Calamites Suckovii*. With his homotype figured in *Fossil Plants of the Devonian and Upper Silurian of Canada*) may be included such of the wide-ribbed stems as do not show the plano-convex ribs of *C. Suckovii*.

The following is the diagnosis of this species given by Lesquereux:—

Stems large; articulations variable in distance; furrows broad obtuse, sometimes marked in the middle by a sharp thin line; ribs convex wedge-form and alternately joined at the articulations; scars of leaves distinct, obsolete or absent.

Lesquereux says that “the species is much like *C. Suckovii* and separated from it by rather indefinite characters. The ribs are larger, more distinctly convex, wedge-form and alternately connivent at the articulations; the furrows broader, more obtusely carinate. The ribs are generally broader, more flattened toward the obconical base of the stems, sometimes bearing distinct, round tubercles.”

Of this species R. Kidston says:—“A very unsatisfactorily defined species, and in many cases it is extremely difficult to decide whether certain specimens should be referred to *Calamites Suckovii* or *C. cannaeformis*.”

The following are measurements of the examples from the Little River group that come nearest to *C. cannaeformis*:

Locality and Horizon		Length mm	Width mm	Length of nodes mm	No. of ribs in 1 cm.
F.L.* —	Dawson's homotype as figured..	135	65+	7-35	2½-3
“ , Bed 2	Stem with broad rounded ribs..	100	80	6-35	4
“ , —	“ “ “ “ “ ..	?	70	?	4

* “F.L.”—Fern Ledges at “Bay Shore,” Lancaster, St. John county, N.B.

The width of the ribs in the second and third examples is that found in *C. Suckovii*, and it is possible that the first only should be referred to *C. cannaeformis*.

CALAMITES SUCKOVII, Brongt., Plate I, Fig. 4.

Brong't, Hist. Végét., p. 124, pl. XIV, fig. 6. &c.

Lesq'x, Coal Flora of Penn., p. 20, pl. I, figs. 3, 4.

D. White, Flora Low. Coal Meas. of Missouri, p. 146.

Many stems of *Calamites* of the Little River Group agree more nearly with this species than with *C. cannaeformis*.

Of this species (including *C. cannaeformis*) Sir William says, “I cannot find any characters separating it from specimens found in the Carboniferous. It was a true *Calamites*, and several of my specimens

show the scars of the branches [leaves?] at the top of the ribs. I have also specimens showing the base of the stem, terminating in an oblique point exactly as in the Carboniferous species and showing that these plants grew in groups or stools in the manner of ordinary *Calamites* of the Coal Measures."

The following is the diagnosis of this species:—*Stems generally broader than the space between the articulations (internodes); ribs half-round or plano-convex, obtuse at the articulations, furrows narrow, obtusely carinate; tubercles or impressions of the bases of the leaves more or less distinctly oval.*

Of this species Lesquereux says, "The stems average seven to twelve centimetres in thickness, when not flattened. The epidermis is very thin, smooth, and the bark also thin, the ribs distinct, the articulations somewhat variable, close toward the base. When decorticated, the under surface, distinctly ribbed, is narrowly striate lengthwise, more obscurely so on the outside surface.

"This most common species of our coal is generally represented in flattened fragments in the shale overlaying the coal, but always in cylindrical sections of stems in the sandstones.

"The tubercles are mostly oval, but also sometimes round, half-globular, smooth, placed at the top of the ribs, rarely at their base."

Having found numerous examples of this species among the material from the strata of the Little River group, and knowing its very wide range, geologically, extending as it does to the summit of the Palaeozoic formations, it appeared desirable to give the species a closer study than that given to other species of the genus found in the Devonian rocks, especially in comparing it with Coal Measure types, more especially to see how far the length of the joints and the width of the ribs could be depended on for diagnosis.

Five examples from the Joggin's Mine in Nova Scotia, one upright and round, from the sandstones, and one flattened, from the shales presented the following characters: In the one from the sandstone the base is unusually obtuse and the top is absent, having decayed away, or been broken off at a height of fourteen inches from the base. In this height there are thirteen joints, all with well defined cicatrices of leaf bases, (or roots) showing there was a whorl of such appendages at each node. For one-quarter of the length from the base the joints increase rapidly in length, but for the remainder of the stem do not change more than a few millimetres in length from joint to joint. The section of the stem is oval owing to lateral compression, and the width of the ribs corresponds to this being a fifth narrower on the more convex quarter. The width of the ribs is that which we find in many

examples of the stems of this species, being three to a centimetre near the base, and four to a centimetre on the rest of the stem. The following figures show the relation of the width of rib to the position on the stem.

Length of internodes in mm.....	4	5	8	10	16	26	30	36	40	40	41	41	45
Number of ribs to 1 centimetre....	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	4	4	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	5	5	5

The long diameter of the stem is 50 mm.

A flattened example of the same width as the above from this mine has a much stronger curve from the base where it is more acutely pointed than the preceding example.

Length of internodes in mm....	3	7	10	14	20	23	28	32	26	40	50	50
Number of ribs to 1 centimetre....	10	$6\frac{1}{2}$	5	4	4	4	$3\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	5	$5\frac{1}{2}$

The basal joints in the stem are more elongated than in the former, which perhaps may account for the more numerous ribs there. In the upper part of both stems the elongation of the joint is accompanied by a slight narrowing of the ribs.

Sculpture.—The surface of the epidermis in this species is very finely striated longitudinally; these striæ nearly abut against the lower side of the leaf scars, which are large and oval, or round, and are placed at the upper ends of the ribs; but the striæ draw together and unite above the leaf scar, becoming more prominent; on the surface of each rib there are about thirty of these fine striæ.

The stem is also marked with fine longitudinal striæ beneath the bark, but less distinctly than on the surface of the latter. In this it differs from *Asterocalamites* and *Calamodendron* in which the striation and ribbing are strongest on the inside of the ligneous cylinder.

The following are dimensions of examples of *C. Suckovii* from the Little River group:—

Horizon and Locality		Length in mm.	Breadth in mm.	Length of internodes in mm.	Number of ribs to 1 cm.
F. L. } Lower Cordaite	{ Homotypes in Nat. Hist. Soc. coll'n, under the name of <i>C. canneformis</i>	150	135	50	3-4
		65	55	....	3-3½
Murphy's Pt., } Up. Cordaite	{ Highest sub-flora of Little River group.....	170	50+	70	4
F. L., Lower } Cordaite ...	{ Second sub-flora of Little River group.....	45	....	....	3½
Dadoxylon } Sandstone, Duck Cove	{ First sub-flora of Little River group.....	70	50+	....	3½

The length of the nodes in these specimens indicate that they came from the main part of the stem, but it will be seen that Coal Measure examples with a similar length of node had ribs considerably narrower. Whether this was accompanied by other differences of foliage, etc., we do not know, but so far as the relief of the ribs is concerned, and the arrangement of the ribs and furrows, the plan of structure of these stems, so widely different in age, is similar.

CALAMITES GENICULOSUS, n. sp. Plate II, Fig 5, and Plate VIII, Fig. 1.

A species with short internodes and thin epidermis, and showing but weak vascular support. A stem 52 mm. wide has internodes 32 mm. apart; the decorticated stem shows six or seven ribs in the space of a centimetre; these ribs apparently are alternate; the diaphragms are weak, and the scars of the leaf bases inconspicuous.

Leaves long, narrow, rigid, erect, dichotomous at intervals; they are from one to one and a half mm. wide and 70 mm. or more in length, branching at an acute angle; the outer leafing branches are more divided than those next the main stem.

A portion of a young stem shows more frequent nodes than that above described, and is probably from near the root. The nodes are 8 to 12 mm. apart, and have alternate ribs of which about seven fall in the space of a centimetre. A dichotomizing branch from this young stem is 70 mm. long and has five nodes in that distance. The branch is erect and grew at an acute angle from the stem, the leaves extending mostly on the side away from the main stem; they are erect, are about 1 mm. wide and 30 mm. long; the nodes whence they spring or bifurcate are 2 mm. wide; the dichotomy is sub-regular, several leaves forking at an equal distance from the branch.

Sculpture.—The stem is smooth when not decorticated, but when deprived of the bark is seen to be minutely striated lengthwise on the ribs.

In a comparison of this species with *Calamites approximatus* important differences appear; the nodes are closer and the vascular bundles weaker; also the bark is quite thin and the ribs are much narrower. The dichotomous leaves recall those of *Asterocalamites scorbiculatus*, but the leaves of that species as shown by Stur's figure¹ are flexuous, whereas these are stiff and erect.

Horizon and Locality, Lower Cordaite shale, Fern Ledges, Lancaster. Special bed not noted.

¹ Zittel's Palæontology, Vol. III (Plants) p. 171, fig. 133.



The following is a tabulated showing of the dimensions of this species:—

Horizon and Locality		Length in mm.	Breadth in mm.	Internodes in mm.	Number of ribs to 1 centim
Lower Cordaite shale at the	Author's cabinet, Pl. II., fig. 5	145	55	32	6-7
	“ “ Pl. VIII., fig. 1	50	16+	8-12	6-7
Fern Ledges, Lancaster..	Collection of the Natural History Society.....	35	30	?	6

CALAMITES CISTIL, Brong. mut. Plate III, Figs. 1 and 2.

Brongt, Hist. d. Végét. Foss. p. 129, pl. XX.

Lesq'x, Coal Flora of Penn. p. 27, pl. I, fig. 6.

D. White, Flora Low. Coal Meas. Missouri. p. 149.

The following are the character of the species *Calamites Cistii*, Brongt. as given by Leo Lesquereux:—

Articulations about equally distant, except toward the base; ribs narrow, half round, with obtuse striate furrows; tubercles generally absent or small, round, indistinct.

He adds, “the species is easily recognized by its regular narrow ribs, either convex or half round, the length of the internodes greater than in *C. Suckovii*, and the general absence of leaf tubercles. The stems are generally of small size, at least never as large as the distance between the articulations.”

Among the common species of *Calamites* in the Little River strata is one which Sir William Dawson has not separated from *Asterocalamites scorbiculoides* (*Calamites transitionis* of Sir William's essays), but which on account of the alternate ribs and their narrowness is evidently distinct from that species. It has the following characters:—

Stems with long joints and close narrow ribs, and generally obscure leaf scars. The internodes are usually twice as long as the width of the stem. The stem is smooth when not marked by the impression of the vascular bundles within; elsewhere it rises in rounded ribs resembling those of Asterocalamites scorbiculoides in form and striation, but the ribs are much narrower than in that species and are marked by about two irregular longitudinal striations.

The following table gives the dimensions of several examples of this mutation:—

Horizon and Locality		Length of stem in mm.	Width of stem in mm.	Length of internodes mm.	Number of nodes in 1 cm.
Fern Ledges, Bed 7	<i>C. Cistii</i> , mut.....	120	45	85	10-11
“ “ “	“ “ Pl. III., fig. 2.	130	30	70	12
“ “ N.H.S.	Coll'n, as “ <i>C. transitionis</i> ”	90	35	....	10
“ “ “	“ “	70	37	....	9
Duck Cove.....	{ <i>C. Cistii</i> , mut, short } nodes, Pl. III., fig. 1. }	140	65	47	10
Dadoxylon Sand	{ <i>C. Cistii</i> , mut, young } shoot..... }	100	11	37	10

For comparison with this ancient mutation of *C. Cistii*, one may present the characters of typical examples of this species from the coal measures of Joggins, N.S., also having long internodes and narrow ribs. They have the following characters:—The epidermis is thin and in this flattened stem the ribs show quite distinctly, though less markedly than in decorticated examples. The ribs are alternate, the furrows shallow, and the leaf scars inconspicuous; these scars are small, oval and placed on the sides of the ribs or between the ribs, and thus are likely to be overlooked; thus a scar frequently comes opposite the rib of the next node. A flattened stem 53 mm. wide has the following proportions in its parts:—

Length of internodes in mm.	70	74	74	74
Number of ribs to 1 centimetre.....	9½	9	9	9

The epidermis in this species is thin and is more obscurely and more irregularly striate than in *C. Suckovii*, and its surface is less brilliant; there are about twelve of these minute striæ to a rib, and where they approach the leaf-scars their course does not change much, nor do they show the strong wrinkles, concentric to the leaf scar, seen on the surface of the stems of *C. Suckovii*. *C. Cistii* is striated on the surface of the mould, but less distinctly than on the outer surface of the bark.

A flattened stem from the same bed of shale (over the Main seam at Joggins mine Coal Measures) has the following dimensions:—

Length of internodes in mm.....	33	32	30	30	30
Number of ribs to 1 centimetre.....	10	9	8	9	8

The position of the leaf scars, and their form, as well as the alternation of the ribs in the mutation of *C. Cistii* from the Little River group agrees with these typical forms from the Coal Measures of the Joggins, and the epidermis is similarly striate, although the proportion in the length of the internodes and the width of the stem are those of *C. Suckovii*.

Though we should give in this way a wide range of variation to the characters of *C. Cistii* there still remains in the Devonian mutation a marked difference in the width of the ribs as will be seen by comparing the dimensions of the Coal Measure with the Devonian forms, the ribs of the latter being narrower.

ASTEROCALAMITES, Schimper.

I use the above generic name for the plants of the Little River group which Sir William Dawson has described under the name *Calamites transitionis*, Goepf.

Mr. Robert Kidston has traced the synonymy of this type through Archæocalamites, Stur, and Bornia, as used by Lesquereux. He has adopted Asterocalamites given by Schimper in 1862. The specific name of the European species was given by Schlotheim in 1822-23.

ASTEROCALAMITES SCORBICULOIDES, n. sp. Plate I, Fig. 1.

The distinction between this species and *A. scorbiculatus* is chiefly in the leaves. Lesquereux's description of *Bornia radiata* (*A. scorbiculoides*?) is as follows:—

Stem cylindrical, articulate and furrowed as in Calamites; articulations scarcely contracted; ribs cut square or obtuse at the articulations; continuous, not alternating, thinly striate; cortical cylinder thick; leaves verticillate, free, linear lanceolate.

Lesquereux has numerous specimens from the sub-conglomerate of Alabama (Carboniferous) five to eight centimeters in diameter; "the ribs seem very variable in width—one to three millimetres." He says, "the articulations are generally very narrow, cutting across the ribs, which are thus continuous, parallel and without deviation. In some rare cases the articulations are slightly contracted."

Schimper's description of the European species *Archæocalamites radiatus*, Brgt.¹ is as follows:—*Stem erect arising from an arched base, rooting, having a width of 2 to 10 cm., more or less elongated in the joints, having the grooves continuous across the articulations, mould*

¹ Zittel's Palæontology vol. III (Plants) p. 171.

finely striated, branches not numerous; leaves long, several times bifurcated, with slender segments, almost filiform, arched; fructification in spikes, groups (?) of fertile verticils alternating with foliar verticils; sporangiphores enlarged to a shield (?) on which are inserted 4 (?) sporanges; structure of the stem unknown."

"What is known of *Archæocalamites* does not enable us to fix its systematic position. So far there is only one species of the genus."

Stem.—There is nothing in Lesquereux's diagnosis (of *Bornia radiata*) that will separate the Canadian forms from his species, but we find no such variability in the width of the ribs as he described; this will appear from the following table showing the dimensions of stems collected from the Little River terrane:—

Horizon and Locality		Length in mm.	Width in mm.	Internodes in mm.	Number of ribs in 1 centim.
Fern Ledges.....	{ Figured by Dawson Fossil Plant Dev. & U. Sil..... }	150	65	105?	7
Fern Ledges.....	Nat. His. Society Coll'n...	130	25	100	7
" " Bed 2	Author's cabinet, Pl. 1, } fig. 1..... }	190	35	85	6
" " "	Author's cabinet.....	110	37	?	6½
" " Bed 7?	" "	180	41	60	6
" " "	Author's cabinet, perhaps C. Cistii.....	110	34	70	9
" " Bed 2	Author's cabinet, perhaps } C. Cistii, alternate ribs. }	80	30+	?	6-7

There is here very little variation in the width of the ribs in the first five examples though the width of the stem and the length of the internodes vary considerably. But none of these show the base of the stem, where, perhaps, the ribs were wider, nor the ultimate shoots where the ribs may have been narrower.

As will be seen the internodes in this species were long, varying from a half longer to four times longer than the width of the stem,

and the nodes sometimes obscurely marked in the flattened stems, and difficult to distinguish because the ribs run continuously from node to node.

Sculpture.—Typical examples of this species have about 6 or 7 ribs in the space of one centimetre; but there are examples with wider ribs, and others narrower; in these, however, the ribs may be alternate, the wider examples may be poorly preserved stems of *C. Suckovii*, and the narrower of *C. Cistii*.

The outer surface of the skin may be smooth in uncompressed specimens, but all that we have are flattened and carry minute longitudinal striations; this is more clearly seen on the interior of the bark where the vascular bundles of the skeleton of support are impressed; there are about fifteen or twenty of these minute striæ on each rib, and the number of the striæ and the elevation above the surface is irregular.

The leaves of these plants from the Little River terrane resemble those of *Asterophyllites longissimus* described further on. These long, straight and rigid leaves are quite different from the bifurcating, flexuous leaves described by Stur and Schimper as characteristic of the European species *Archæocalamites radiatus* (= *Asterocalamites scorbiculatus*) hence it has been thought better to distinguish these old stems as *A. scorbiculoides*. Since Lesquereux has found that similar straight leaves belong to the form from Pennsylvania which he has referred to *Bornia radiata* it seems possible that this may be the species *A. scorbiculoides*, but of a later age. The fossil from Little River beds which resembles the branch which Lesquereux has referred doubtfully to *Bornia radiata*¹ has a much slenderer stem than *Asterophyllites longissimus*, which, as I have mentioned above, appears to be the leafing portion of a species like *A. scorbiculoides*. As I have not found this object in actual connection with *A. scorbiculoides*, however, I do not feel justified in uniting it with that species.

The irregular ribbing of *Asterocalamites* and the straight-across furrow, as well as a tendency to be contracted at the nodes, would seem to show a relationship to *Calamodendron*.

RAMICALAMUS n. gen.

This form is one of those comprehensive types like *Arthrostigma*² found in the early Palæozoic floras that combine the characters of several of the later genera.

¹ Coal Flora, Penn., Vol. III., pl. XCIII., fig. 2.

² Fossil plants of the Devonian and U. Silurian of Canada, p. 41.

It was a branching plant of rapid growth that flourished in wet sand, and has been found chiefly in the lower part of the Little River group (Dadoxylon sandstone), but also at the top of the Cordaite shales.

Stem freely branching, often in a distichous manner, solid near the base (fistulous in the upper branches?) irregularly and intermittently ribbed lengthwise; branches jointed at intervals and bearing at the joints one or several whorls of long tapering rigid leaves, usually two or three times as long as the internodes.

There is a sheath or annulus at the base of one row of the leaves. Fructification unknown.

This form differs from *Asterophyllites* in the presence of several whorls of leaves at a node and in having an annulus. From *Annularia* it differs in not having the whorls of leaves flattened to the plane of the stem and in the enlarged and solid nodes. From *Calamites* in the absence of a regular ribbing on the stem and in having a solid axis. From *Arthrostigma* in the regular and more distant nodes and the absence of leaves from the internodes. The plant shows an analogy to *Equisetum* in the possession of a sheath or annulus to the upper whorl (when there is more than one whorl) this upper whorl may be compared to the sheath in *Equisetum*.

RAMICALAMUS DUMOSUS n. sp. Plate VIII, Figs. 2, 3, 4 and 5.

STEM.—*The main stem is an inch or more in width and branches freely in the lower part; it there throws off strong branches at a wide angle—branches which sometimes are as large as the main stem. The opposite branches occur at nodes which are enlarged and more woody than the internodes. These bear long, rigid leaves of varying density and size; the stouter ones are sometimes two or three times as long as the internodes; there are sometimes two or three whorls of leaves at an internode, and in such case the upper whorl has an annulus or membrane connecting the leaves about as wide as the diameter of the stem; this membrane is continued up on the sides of the leaves so that they are winged for about an inch from the base.*

LEAVES.—*The principal leaves are from 3 to 5 mm. wide at the base, 10 to 20 cm. long and taper gradually to a point. The mature leaf was thick and round, or channelled on the upper side; this leaf when flattened had two or three irregularly raised intermittent longitudinal ridges, which are wanting in the broader flattened part of the leaf near the base; a mid-rib is seldom seen, though some thin, flat leaves on the lower whorls of an internode may have a shining vascular*

line along the middle. When there are several whorls of leaves at an internode the outer (lower) leaves are narrow (1 to $1\frac{1}{2}$ mm. wide) and thin, and leave but a faint impression on the stone; these leaves are about 9 cm. long and are somewhat concave on the upper side.

ANNULUS.—A distinct annulus or sheath is found at the upper whorl of leaves of a node; the leaves pass through this membrane (i.e., are outlined against its thinner substance). The annulus is about three times the width of the stem at the upper branches of the plant, and no annulus has been observed on the lower whorls of an internode where more than one whorl is present.

ROOT?—An elongated undulating band of a root or rhizome occurs in the sandstone beds where *Ramicalamus* is found which pushed its growth through the sand where this plant was imbedded; it is, perhaps, the root or rhizome of this species; apparently only one side was preserved, the other may have been more perishable. It has obscure, low, lanceolate areoles on its surface that resemble the bolsters of a badly preserved *Lepidodendron*. These rhizomes has a length of fifteen centimetres or more, and a width of one and a half centimetres.

Examples of what appear to be the upper branches of this plant resemble *Asterophyllites rigidus* Gein., but the leaves are more elongate; in this part of the plant the leaves are less spreading than in the lower whorls, and they are more rigid; the longest leaf (though the full length is not shown) is 7 cm. long, and is heavily channelled for a part of its length; the flattened stem is 3-4 mm. wide; it is striate lengthwise with about nine grooves; the nodes are about 35 mm. apart, and there is a whorl of about 12 leaves at each node, spreading upward at an acute angle.

Horizon and Locality—This species was collected from the Dadoxylon sandstone at Duck Cove, Lancaster, N.B., about two hundred feet below the summit of the Dadoxylon sandstone by Mr. Wm. McIntosh. The specimens described above as probably the upper branches of this species were collected from Bed No. 1 of Hartt's section at the Fern Ledges by Mr. Geoffrey Stead. Both are, therefore, from the Dadoxylon sandstone. The species occurs also in the higher beds of the Upper Cordaite shales, in sandstone layers, at Murphy's Point, on the east side of St. John Harbour.

LEPIDOCALAMUS, n. gen.

In his Acadian Geology Sir Wm. Dawson figured and described a peculiar plant from the Devonian rocks at St. John which he referred doubtfully to the genus Calamites and which, in his later work on the Fossil Plants of the Devonian and Upper Silurian formations of Canada, he included in the species described under *Asterophyllites*. Doubtless he saw the radical differences between this plant and the true Calamites in the structure of the stem and the nature of the leaves. But the objections to classing it with *Asterophyllites* of Brongniart are almost equally strong as those which separate it from Calamites, while from *Annularia* of the same author (into which many of the species of *Asterophyllites* described by Sir William will fall) there are equally notable departures. It appears to the author that these objections are best satisfied by the use of a separate generic name as above.

Stems solid, but not of dense substance. Simple, round, reed-like with enlarged and denser nodes at intervals. Several weak bundles of vascular tissue, irregularly disposed.

The leaves are in whorls and are of two kinds, one (which may be bracts) oval and bluntly pointed; the other broad ovate, convex and attached to the enlarged nodes; these are supposed to be of the nature of fruit scales or pods; the narrower oval leaves are often wanting on old parts of the stems and may have been deciduous, the former are more persistent. The root was elongated, succulent.

This genus differs from *Asterophyllites*, Brongt. in having no leafy branches and in having a prominent enlargement of the node. From *Annularia*, Brgt. it differs in its short curved leaves and in having no strong middle nerve to the leaf. From *Calamocladus*, Schemp. it differs in the absence of branches to the main stem, also the leaves of the verticles are few, and not straight nor linear. It may be compared with *Palæostachya*, Weiss, if it be regarded as an extended spike having several leafing whorls alternating with one fruiting whorl.

LEPIDOCALAMUS SCUTIGER, Dawson. Plate IV, Figs. 1 to 9.

Dawson, *Asterophyllites* (?) *scutigera*, Dn. Acad. Geol. p. 539, Fig. 187 C.

Dawson, *Asterophyllites scutigera*. Foss. plants, Dev. & U. Sil. Can. p. 29, pl. V. fig. 58, 59.

Dawson's original description of the species is as follows:—*Stem simple elongated, attaining a diameter of half an inch, obscurely striated; bearing on the nodes whorls of round or oval scales, or flattened nutlets, which at the end of the stem are crowded into a sort of spike, while on other parts of the stem the nodes are sometimes an inch apart.*

"This is a plant of uncertain nature which I place only conjecturally in this genus [*Asterophyllites*]. The stems which are very long may have been horizontal or immersed, and the apparent scales may either have constituted a kind of sheath as in *A. coronata*, Unger, or may have been seeds or nutlets, flattened like the rest of the plant. Near some of the specimens are fragments of linear leaves which may have belonged to this plant, though I have not found them attached. When flattened obliquely the stems appear as rows of circular marks, which represent the harder tissues of the nodes, and have a very singular appearance.

"This plant, though found with the preceding [*Annularia latifolia* Dn.], does not occur in the layers which contain other plants, and this may, perhaps, mark a difference of habitat."

In his Fossil Plants of the Devonian and Upper Silurian formations of Canada, Sir William adds that the plant may have been a sheathed species like Unger's *A. coronata*, deprived of its leaves, or a semi-aquatic stem, bearing scales instead of branches at the nodes. He further remarks that the singular species of Pinnularia, *P. nodosa*, is found in the same beds and may have been connected with this plant. He also figures a shoot with whorls of leaves, as occurring with this species.

Stem.—There is much to support Sir William's view that this plant was semi-aquatic. I have not found examples like that figured in the Acadian Geology with six strong ribs to the stem; this would imply a cylinder of strong vascular fibres surrounding the soft interior of the stem as in Calamites, but the skeleton of support seems very weak and made little impression on the mould of the fossil even when flattened. A stout support of this kind would not be necessary in a submerged stem.

Nodes.—It is, perhaps, the weakness of the vascular bundles of the internodes and the comparative density of the nodal structures that make the latter stand out prominently, and be preserved in the sandstone layers, when the structures of the internodes have perished. Often a series of greyish circular or oval marks on the surface of the sandstone layer is all that remains to mark the former presence of stems of this species.

Internodes.—There is much variation in the length of these according to the part of the plant preserved; this varies from half of the width of the node near the base of the stem to three times the width in the example figured by Sir William Dawson.

Young shoots.—The author cited has figured two examples of the young shoots of this species, one in Acadian Geology, the other in his work on the Fossil Plants of the Devonian, etc., of Canada; in both

the leaves are longer and looser than those of the young shoots which have come under my observation. The leaves are in whorls of about six in the young shoots.

Terminal spike.—A structure which Sir William did not have, but which apparently belongs to this species; it is an oval cone or spike covered with closely applied short bracts, convex, outward; this may be compared to the conical spike on the apex of the stem of *Annularia latifolia* Dn. as figured in *Acadian Geology*, page 538.

Habitat.—This plant, with its leaves, has been found in Bed No. 2 of Hartt's section in addition to Bed No. 1; the defoliated stem figured by him is evidently from the intermediate sandstones, where such specimens are not infrequent; it seems probable that the mascerated stems are drifted portions of the plant; the leaf-bearing fragments are from the Shale Bed No. 2.

Horizon and Locality.—Sir William appears to have known this plant from Hartt's Bed No. 1; it, however, is not confined to that bed, and, indeed, is more common in the beds above; it is not infrequent in the sandstones that come between this bed and Bed No. 2; it thus forms one of the connecting links between the first and second sub-floras of the Little River group.

VARIETY.

While a soft, succulent stem is the usual condition of examples of these nodose stems, occasional more slender stems are to be met with in the sandy shale of Bed No. 1, which have a good support of vascular tissue. The nodes in these appear to be of two kinds, one of which seems to bear narrow rigid leaves, but the other is surrounded by a ring of nodules or capsules; from the way in which they are crushed in in the shale they would seem to have had a soft centre, or to have been hollow. There are about six or eight of these capsules or sporangia in the ring around the node. The barren node has a ring of pointed bracts, not much longer than the sporangia of the fertile nodes. The stem is considerably enlarged at the fertile nodes, and, except for the enlarged nodes might be mistaken for the stems of the *Annularias* among which it is embedded.

This plant differs from the genus *Asterophyllites* in the presence of short bracts or capsules in place of long leaves.

Horizon and Locality.—From Bed No. 1 of Hartt's section, scarce.

ASTEROPHYLLITES Brongniart.

In this genus the writer has retained such species described by Sir Wm. Dawson as do not fall under *Lepidocalamus* or *Annularia*. By some authors a number of these would be included in *Calamocladus*, a genus established by Schimper to include branches of *Calamites*; the others would fall under *Asterophyllum* of Schimper. He distinguishes this genus from the former by its having three as the fundamental number of leaves in a whorl, as in *Sphenophyllum*, by the absence of a diaphragmatic ring, and by the vascular hardening of the nodes. These distinctions are difficult to apply in the case of the plant remains from the Little River group owing to their broken condition and defective preservation, and it has not been attempted here; *Asterophyllites* has been retained for both groups of species.

ASTEROPHYLLITES LONGIFOLIUS, Sternb. Plate I, Fig. 3.

Sternb. *Bruckmannia longifolia*, Versuch, vol. 1, p. xxix, fac. 4, pl. lviii, fig. 1.

Daws. *Asterophyllites longifolia*, Acad. Geol. p. 539.

Lesq'x. *Asterophyllites longifolius*, Coal Flora of Penn. p. 36.

Branches generally small, with distinct articulations, distinctly striate; leaves numerous, very long, open, linear, flat, flexuous.

Lesquereux says that the leaves of this species vary from three to ten centimetres in length, averaging seven or eight. They are very narrow, scarcely one millimetre broad, flat, rather flexuous than rigid, median nerve distinct.

There may be some question as to the reference of the examples from the Little River group to this species, Sir William, although he mentions the species in his *Acadian Geology*, omits it from the final summing up of the Devonian flora¹; perhaps he had found reason to place it elsewhere [as leaves of *Calamites transitionis*?]

The leaves of the plant which we have referred to *A. longifolius*, Brongt., are numerous at the whorls, and, as they are somewhat flexuous, they cross each other on the layers of shale, but I have found no certain proof that they are dichotomous. The branch which Lesquereux figures in the Coal Flora of Pennsylvania² expresses the simplicity of the leaf, and a similar absence of dichotomy holds for examples from the strata of the Little River group.

¹ Fossil Plants of the Devonian and U. Silurian, p. 85.

² Vol. III, Pl. XCIII, fig 2.

Horizon and Locality.—Leaves of this species are common at several horizons in the plant beds; often (as when much flexed and crossed) they are not distinguishable from those of *A.?* *fissus* n. sp., and *A. fasciculatus* n. sp.

ASTEROPHYLLITES FASCICULATUS n. sp. Plate I, Fig. 2.

Stem striate, 6 mm. or less in diameter, internodes 30 mm. long, nodes obscure. Leaves in fascicles at the nodes, 5 or more in a fascicle, long linear sub-rigid, width less than 1 mm., length 50 mm., or more.

This species is not separable by its leaves from *A. longifolia*, but when found in connection with the stem the different mode of insertion at once distinguishes them; also the nodes are different, the nodes in this species being very inconspicuous.

Locality and Horizon. From the shale of Bed 7 or 8 of Hartt's section at Fern Ledges, Lancaster, N.B.

ASTEROPHYLLITES (?) FISSUS n. sp. Plate VI, Figs. 4, 5 (and 6?).

This species has long slender sub-rigid leaves like the preceding species (*A. longifolia*), but the method of branching distinguishes it.

Stem irregularly striate lengthwise, and the nodes at long intervals (60 mm. in a stem 6 mm. wide).

The leaves are from a half to one mm. wide; they are 3 (sometimes 2) cleft, divisions near the stem or distant from it. The compound leaves throw off branches on each side of pseudonodes; at these points the leaf branches in a ternate manner, but without a true node, as the vascular bundles extend directly from the rachis of the leaf into its subdivisions.

The rachis is flat and broader than the sub-divisions, the ultimate branches being long and slender, with a diameter of one to one and a half millimetres; they are 7 to 8 centimetres long, are rather thick and have a channel or nerve on the upper side.

The nervation and branching thus approaches that of the frond in ferns, but the branches are not alternate, unless some cases of dichotomy may represent the alternate method of division.

What appears to be a terminal shoot or fruiting spike of this species, is occasionally found; this has close nodes and strap-like nerved leaves, which grew in whorls, with six or seven leaves to a whorl. The nodes are about 7 mm. apart, the leaves are about 2 mm. wide and 35+ mm. long; they are distinctly 2 to 3 nerved, and have numerous longitudinal striæ on the intervening ridges of the leaf. The ultimate

ends of the leaves or bracts of this spike are not certainly known, but no appearance of branching was observed.

A portion of a whorl of what may be a young stem of this species shows three forked leaves, narrow and approximating at their base, they are otherwise like the elongated leaves of this species.

The depressed nodes in some examples of this species cause them to resemble branches of *Annularia*, but I could see no annulus or ring at the base of the leaves.

Horizon and Locality.—This species occurs in a shale which has the texture of that of Beds 7 and 8 of Hartt's section.

ASTEROPHYLLITES LENTUS, Dn. Plate V, Figs. 5, 6, 7.

1868 *Asterophyllites laxa*, Acad. Geol., p. 539.

1871 *Asterophyllites lenta*, Fossil plants of Dev. etc., p. 29, pl 5, fig 60.

Dawson's diagnosis is as follows:—

Stem slender, feeble, delicately striate. Leaves long, linear, one nerved, in whorls of about ten.

"This species is founded on a few specimens in Professor Hartt's collections. It is quite distinct in form and habit from any of the others."¹

The type specimens of this species do not show more than seven or eight leaves in a whorl, and they are mostly erect and ascending; they possess a faint mid-rib, and when preserved in their full length the point is acuminate.

Professor Hartt reported *A. longifolia* (which to him included this species from Bed No. 2 and doubtfully from Bed No. 1. The texture of the shale in which *A. lenta* is preserved is that of Bed 2.

The absence of an annulus and the obscurity of the mid-rib would seem to indicate that this species should be retained in *Asterophyllites*.

Horizon and Locality.—From Bed 2, Fern Ledges, Lancaster, N.B.

ASTEROPHYLLITES PARVULUS, Dn. Plate VI, Figs. 1, 2.

Dawson, *Asterophyllites parvula*, Acad. Geol. p. 539, Fig. 188A.

Dawson, *Asterophyllites parvula*, Foss. Plants, Dev. U. Sil. Can., p. 27.

Dawson's description of this species is as follows:—

Branches slender, leaves 5 to 6 in a whorl, subulate curving upwards half a line to a line long (1-2½ mm.). Internodes equal to the

¹ This is the species which Sir William in his *Acadian Geology* described as *A. laxa*. In the specimens returned to the Natural History Society by him it is included under *A. longifolia*, but the type of *A. laxa* is easily recognized among these by the figure given in *Fossil Plants of the Devonian and U. Silurian of Canada*, Plate V. fig. 60.

length of the leaves or less, stems ribbed, with scars of verticillate branches at the nodes.

The attitude of the leaves, the close joints and the stoutness of the rachis in the smaller branches of this plant, would lead one to suspect it might be a *Palæostachya*, but though carefully looked for, no sporangia were found in the axils. The branching of these little stems is frequent and there seem to be only 4 to 6 leaves on them at a node. In the larger branches there are eight leaves in a whorl and these are longer and the nodes further apart than in the more numerous small whorls; these leaves and whorls are each about 4 mm. long.

Horizon and Locality.—From the horizon of Bed 1, Barrack Point, St. John.

This species was originally collected by the author from a black carbonaceous shale at the south end of the city of St. John at the top of the Dadoxylon sandstone, and would be at about the horizon of Hartt's Plant Bed No. 1 at Fern Ledges. Sir William stated that he found it in material from Carleton (probably from Hartt's Bed No. 2, where the author also collected a closely allied, but not the typical form).

Mr. Geoffrey Stead collected from this bed good examples of this allied form, which may be described as follows:—

VAR. Plate VI, Fig. 3.

Stem slender branched, about $\frac{1}{2}$ mm. across; internodes 4-5 mm. long, leaves 4 mm. long, linear lanceolate, subulate, radiating from the node at a wide angle, having a faint mid-rib. Branches slender with nodes 2 mm. apart; leaflets linear, subulate, curved, ascending 2 mm. long; becoming shorter and the nodes closer towards the tips of the branches. Fructification unknown.

Collected in 1889 by Mr. G. Stead.

Horizon and Locality.—Bed 2, Fern Ledges Lancaster, N.B.

This species is retained in *Asterophyllites* because there is no annulus, and because of the rigid, ascending leaves.

ANNULARIA, Brongn.

Most of the plants described or referred to under this genus were originally described by Sir William Dawson under the genus *Asterophyllites*.

These plants have a localized distribution in the strata of the Little River group. Although the stems, leaves and roots of *Annularia* were found abundantly by Professor Hartt in his bed No. 1, they have

not until recently been gathered from below this level; and their occurrence above that bed is capricious; they are found sparingly in beds Nos. 2 and 3, but according to Hartt are wanting from beds 4, 5 and 6 (except one doubtful occurrence); however several species are found in Beds 7 and 8. On the eastern side of St. John Harbor though quite a number of Ferns, Calamites and Cordaites are found, Annularia (and Asterophyllites), are again conspicuously absent.

ANNULARIA LONGIFOLIA, Brongn.

mutation LEAVITTI, Matt.

Bull. Nat. Hist. Soc., N.B. Vol. V. p. 396. Pl. IX.

Stem about 3 mm. wide. Length between internodes 30-37 mm.; about 24 leaves in a whorl; length of leaves 30-50 mm.; width 3-6 mm. There is a strong mid-rib and a slender, pointed tip.

This form is an early mutation of Brongniart's *Annularia longifolia* and a very vigorous one, as may be seen by comparing it with Feistmantel's figure.¹ The leaves are of about the same length, but in some cases are twice as wide. It is also similar to *A. longifolia* Brong. as figured by Lesquereux; his quotation of the specific characters are as follows:—

Stem narrowly striate; leaves in whorls of eighteen to twenty-four, lanceolate, spatulate, more or less abruptly acuminate; median nerve broad, distinct; fructification in long cylindrical spikes.

This applies to examples from the Coal Measures. Lesquereux further explains that the leaves on the primary stem vary from one and a half to five centimetres in length and from two to three millimetres in breadth. They are generally larger above the middle, gradually narrowing downward to the point of attachment, and more rapidly to the point. The mid-rib is broad and deeply impressed, and the border of the lamina flexed or convex. Sometimes, especially upon the shales, the leaves are flattened by decomposition and compression.

Our specimens from the Dadoxylon sandstone agree in most particulars with the above description of the Carboniferous form by Lesquereux. The number of leaves in a whorl of the Devonian mutation is fully as great as in the Carboniferous form, for if the apparently missing leaves of the lower whorl in the specimen figure be allowed for, there would, perhaps, be thirty leaves in a whorl. The mid-rib is depressed and the blade of the leaf on each side is convex.

¹ Zittel's Palæontology, Vol. III (Plants) p. 162.

The great variability in the length of the leaves in a whorl of this species and other differences, seem to me to show its distinctness from *A. stellata*, although Mr. D. White in his description of the size of the leaves of *A. stellata* evidently merges it with that species, and includes it in the synonymy of the latter.¹

In the example of this species figured in this paper the long diameter of the whorl is not at right angles to the stem and five or more leaves of the several whorls are wanting, being concealed in the stone.

Horizon and Locality.—In the Dadoxylon sandstone, Duck Cove, Lancaster, N.B.

Collected by Mr. A. G. Leavitt.

ANNULARIA LATIFOLIA, Dawson sp. Plate VII, Fig. 2.

Dawson, *Asterophyllites latifolia*, Acad. Geol. p. 538, fig. 187, A, B, D.

This is one of the more common species in the lower beds of Hartt's section, and has been well described and illustrated by Sir William Dawson.

There appear to be two forms which are found at different horizons. The type of the species is the form found in Beds 2 and 3, and which is figured in *Acadian Geology*, p. 538, fig 187, A, B, and D; in this two of the lateral leaves of the whorl are narrower than the other leaves. Sir William's characterization of the species is as follows:—

Stem somewhat slender, with enlarged nodes. Leaves oblong-lanceolate, about thirteen in a whorl, one-nerved, longer than the internodes. Length of leaves varying from one-fourth of an inch near the ends of the branches, to an inch or more. The species differs from A. galioides, L. and H., in the number and form of the leaves, and from A. fertilis, Sternb., in the acuteness of the points of the leaves.

In the work first above cited Sir William figured as the apex of the stem of this species, or the fruit (Fig. 187, B.) a compact cone-like body (with two whorls of leaves below it) of crowded leaves or bracts. In the material in my hands I find no transition from this to the young barren shoot, and so favour Sir William's second suggestion in reference to this object that it is a fruiting terminal; but if so, it is undeveloped, as the fruit in *Annularia*, so far as I have seen it is an elongated spike, resembling that of *Calamites*.

¹ Fossil flora of the Lower Coal Measures of Missouri p. 162 &c.

Horizon and Locality.—This form of *Annularia*, as described in the above diagnosis and in the figures cited, is found abundantly in Beds 2 and 3 of Hartt's section, and very rarely in Bed-1.

The author of this species calls attention to its resemblance to *A. galioides*, L. & H., and *A. fertilis*, Sternb. On reference to Mr. Robert Kidston's Catalogue of Palæozoic Plants of the British Museum, it will be seen that he considers *A. galioides* as probably a small branchlet of *A. foliosa*, and this latter to be a synonym of *A. radiata*, Brongt. *A. fertilis* he considers synonymous with *A. stellata*, Schloth. Kidston also places under *A. stellata* the smaller example of Lesquereux, *A. longifolia*, Brongt., of the Coal Flora of Pennsylvania (Plate II, fig. 2), which has a general resemblance to Dawson's *A. latifolia*, but has fewer leaves in the whorls, and these narrower, but he retains for Dawson's species the latter's name—*latifolia*. *A. stellata* then may be looked upon as the Carboniferous representative of Dawson's *A. latifolia*.

variety MINOR n. var.

Dawson, *Asterophyllites latifolia* Foss. Plants, Dev. and U. Sil. Can. p. 28, pl. V. figs. 50 to 53.

The examples of *A. latifolia* Dn., figured by Dawson in his Fossil Plants of the Devonian and U. Silurian formations of Canada are of this variety. It is known by its smaller size and more obtuse leaves; also in the terminal shoots the little leaves are spread wide, whereas in the typical form they retain the upward vernation later, and the young leaves have an ascending position, or even cling to the stem where they are near the tip of the shoot or branch.

The number of leaves in a whorl is the same as in the type—usually twelve, though fourteen are found, and they become reduced in size as well as in numbers in advancing to the extremities of the branches.

I did not find the branches of this variety present the densely leaved point or cone figured by Sir William, but my examples of the terminal barren shoots are sparsely leaved, with somewhat distant internodes. The cone-like tips depicted by that author may be undeveloped fertile cones or spikes (see Figs. 55 and 56—Plants of Devonian and U. Silurian of Canada).

Horizon and Locality.—The home of this variety is Bed 1 of Hartt's section, Fern Ledges, Lancaster, N.B., where it is quite common.

ANNULARIA ACICULARIS, Dawson sp. Plate V, Figs. 1, 2, 3.

Dawson, *Asterophyllites acicularis*, Acad. Geol. p. 537, figs. 194, H.H.²

Dawson, *Asterophyllites acicularis*, Foss. Plants Dev. U. Sil. Can. p. 28, pl. V. figs. 54 to 57.

The following is Sir William Dawson's description of this species.

Stem slender, striate, thickened at the nodes, leafy. Leaves one-nerved linear, slightly arcuate, ten to fifteen in a whorl, longer than the internodes. Length of leaves one-half (12 mm.) to three-fourths of an inch (19 mm.).

"This plant is abundant in some layers of shale in the Little River group. It resembles *A. foliosa*, L. & H.,¹ but the leaves are longer, less curved, and more numerous in a whorl. Some of the specimens show that the stem was leafy as well as the branches, and I have a specimen, apparently the termination of the main stem, showing the whorls diminishing in size toward the apex."

In his later work on the Devonian and U. Silurian Plants of Canada Sir William has added the following remarks: "In some of Mr. Hartt's specimens this and the last species [*A. latifolia-minor*] are associated in such a manner on the same slabs as to suggest the suspicion that they may have been portions of one species. I have failed, however, to trace any connection or intermediate gradations; and on the other hand there are organs of fructification associated with the present species, which are quite distinct from those of the last. They are small, oblong strobiles, with narrow leaves or scales, and sometimes in groups of two or three together. The specimens recently obtained show that the species was similar in its habit of growth to the last [*A. latifolia-minor*], and it grew apparently in the same places."

"This species in general form resembles *A. equisetiformis*, Brong., and in its fructification *A. rigidus*, Sternb., as figured by Geinitz. The species is closely allied to *A. radiata*, Brong., differing principally in the form and number of the leaves. It has a stiff or rigid stem, with a stout vascular axis, and though the leaves sometimes seem united at the base, they fell off separately, and in some beds, great numbers occur detached."

The leaf is rather thick in this species and the mid-rib only faintly marked. As many as sixteen leaves have been observed in a whorl.

Horizon and Locality.—Very plentiful in Hartt's Bed No. 1, and also occurring in Bed No. 2 at Fern Ledges, Lancaster, N.B.

In the same beds with *A. acicularis* occur occasional examples of a *Palæostachya* of small size, with rigid linear bracts, which we sup-

¹ A synonym of *A. radiata* Brong. fide R. Kidston.

PALÆOSTACHYA ACICULARIS, n. sp.

pose may belong to this species, but they have not been found attached to its stem or branches.

The rachis is about $1\frac{1}{2}$ mm. wide, and the nodes about 3 mm. apart; each node bears several rigid ascending linear bracts about 5 mm. long; in the axils of these bracts there is a short ascending stalk that bears a double spore case (or a single spiral case attached by its back to the stalk). Eleven nodes of the spike are known.

Horizon and Locality.—From Bed No. 2 of Hartt's section at Fern Ledges, Lancaster, N.B., scarce.

ANNULARIA RECURVA, n. sp. Plate II, Figs. 1 and 2.

Only the smaller branches known. These are 2 mm. wide, striated, nodes distant (25 mm. apart). Leaves in fascicles from each side of the stem, thick, revolute; about five groups of leaves at a node, and about five leaves, or less, in each group, one nerved, 2 mm. wide at the base and about 20 mm. long. Younger examples with leaves less recurved, have nodes at shorter intervals; the leaves are much fewer on the young shoots, about six on small terminal twigs, where they are 3 mm. long.

The leaves in this species are thick as in *A. acicularis*, but are shorter in proportion to the internodes, and are strongly recurved.

Horizon and Locality.—From Bed 2 of Hartt's section at Fern Ledges, Lancaster, N.B.

ANNULARIA (?) LIGATA, n. sp. Plate II, Fig. 4.

Only a few examples of this species are known.

Stem 4 mm. wide, striate, weak, internodes rather close. Leaves few (4 to 5) at a node, broad, 4 mm. wide, and 25 mm. (or more) long, and terminating in a mucronate point; they are short lanceolate-linear, 5 nerved and rather abruptly pointed at the end, the nerves converge to the point.

The leaves of this plant spread from a weak internode like those of *Annularia*, but the numerous veins distinguish it from others of this genus. It is separated from *Sphenophyllum* by the absence of dichotomy from the veins. It may be compared to such species as *Annularia recurva*, and *Asterophyllites faciculatus*, in which the leaves are arranged in tufts or groups around the node; in this, however, it is the nerves that are arranged in groups. This form may be the type of a new genus, but the material is too defective for diagnosis.

Horizon and Locality.—From Bed 2, Fern Ledges, Lancaster, N.B. Not rare.

SPHENOPHYLLUM, Brongt.

SPHENOPHYLLUM ANTIQUUM, Dawson. Plate III, Fig. 3.

Dawson, *Sphenophyllum antiquum*, Acad. Geol. p. 540, fig. 188 B.Dawson, *Sphenophyllum antiquum* Foss. Plants, Dev. and U. Sil. Can. p. 52, pl. VI, fig. 61, 62.

Dawson's description is as follows:—

"*Leaflets cuneate, one-eighth of an inch wide at the apex and less than one-fourth of an inch long. Nerves three, bifurcating equally near the base, the divisions terminating at the apices in six, obtuse acuminate teeth. About eight leaves in a whorl.*

"This plant was described from a few detached leaflets from the graphitic shale of St. John, which preserve their form and venation in the most wonderful perfection, though they were completely changed into films of shining graphite. I have since obtained from Mr. Hartt a specimen found in Carleton which, though the individual leaflets are more indistinct, show their general arrangement in whorls of eight or nine on a slender stem. It is a beautifully symmetrical little plant, quite distinct from any species of the Coal Measures."

I have found no better material representing this rare species than that which passed through Sir William's hands and so cannot add to his description.

In my examples the sinuses are not so sharply cut as in that figured by the author of the species, and the mucros are less acute.

This species may be compared to *S. erosum*, L. & H., as regards the venation, but the points at extremity of the leaf are shorter than in that species.

Horizon and Locality.—Collected by the author from the highest shale bed of the Dadoxylon sandstone at Barrack Point, St. John. Rare.

GENERAL REMARKS.

The division of this flora into three groups of stratigraphical value is based on a general survey of the species found to be present in the several parts of the terrane. Whether these distinctions are due to the actual extinction of species, or are only of ecological importance remains to be determined. But Hartt's section shows that there was a scarcity of Equisetales in the upper part of the second subflora, and the same is true of the flora which occurs in the Upper Cordaite shales of the eastern side of St. John Harbor.

It is also to be noted that some peculiar types of the Equisetales as *Ramicalamus*, and *Lepidocalamus* are specially characteristic of the

first subfauna; but the former is also found in the Upper Cordaite shale east of St. John Harbor. And here again the ecological question comes up, for it is evident that these two forms were lovers of the borders of shallow ponds occurring in hollows of the river-sands which constituted the bulk of the Dadoxylon sandstone; they, no doubt, existed elsewhere, under suitable conditions both earlier and later than their growth on the border of these sand-enclosed pools.

The varieties and mutations of other species noted in the above descriptions are, no doubt, also due to an environment specially suitable to the production of the differences noted. As instances of luxurious growth under favourable conditions one might refer to *Annularia latifolia*, as compared with its earlier form *A. longifolia-minor*, and the luxuriant whorls of *Annularia longifolia*—*Leavitti* as compared with the ordinary later growths of this species as preserved in the Coal Measures.

It is an unexpected discovery to find such common species of the Coal Measures as *Calamites Cistii* and *Calamites Suckovii* flourishing in full perfection at this early time in Geologic History. It shows how much we have yet to learn respecting the first appearance and distribution of the denizens of the land and the estuaries, both animal and vegetable, for if we have the identical plants of the Carboniferous time in these plant-beds, why may we not have as well the land-snails, the insects, the myriapods and the amphibians of Carboniferous type.

EXPLANATION OF PLATES.

PLATE I.

- Fig. 1. *Asterocalamites scorbiculoides*, n. sp. 1a Part of the stem, partly decorticated, showing two joints and part of two others, Natural size, From Bed 2 Fern Ledges, Lancaster N.B. 1.b. A leaf, after Dawson. See p. 102.
- Fig. 2. *Asterophyllites fasciculatus*, n. sp. Part of the stem with two groups of leaves, Natural size. From Bed 7. Fern Ledges, Lancaster N.B. See p. 111.
- Fig. 3. *Asterophyllites longifolius*, Sternb. Part of stem showing three nodes and the leaves. Natural size. From Bed 3. Dadoxylon Sandstone Duck cove, Lancaster, N.B., See p. 110.
- Fig. 4. *Calamites Suckovii*, Brongt. Part of stem showing a node and the scars of the leaf bases. Natural size. From Bed 2. Fern Ledges, Lancaster, N.B. See p. 97.

PLATE II.

- Fig. 1. *Annularia recurva*, n. sp. Part of stem showing three nodes, and the leaves. Natural size. From Bed 2. Fern Ledges. See p. 118.
- Fig. 2. and 3. The same, young shoots, showing the shorter and less numerous leaves. Natural size. From Bed 2, Fern Ledges, Lancaster, N.B.)
- Fig. 4. *Annularia* (?) *ligata*, n. sp. Part of stem with three whorls of leaves. Natural size. From Bed 7? Fern Ledges, Lancaster, N.B. See p. 118.
- Fig. 5. *Calamites geniculosus* n.sp. Part of stem, mostly decorticated, showing leaves extending from three nodes. Natural size. From Bed? Fern Ledges, Lancaster, N.B. See p. 99.

PLATE III.

- Fig. 1. *Calamites Cistii*. Brongt. mut., n. mut. Part of lower part of the stem showing three nodes. Natural size. From Bed 3, Dadoxylon Sandstone, Duck cove, Lancaster N.B. See p. 100.
- Fig. 2. The same. Higher part of the stem showing two nodes; ribs closer than in this figure. Natural size. From Bed 7. Fern Ledges, Lancaster N.B. See p. 100.
- Fig. 3. *Sphenophyllum antiquum*, Dn. A single leaflet shewing the venation, &c. Mag. $\frac{1}{2}$. From Bed (equivalent to Bed 1 of Hartt's section) at top of Dadoxylon Sandstone at Barrack Point, St. John, N.B. See p. 119.

PLATE IV.

- Fig. 1. *Lepidocalamus scutiger*, Dn. Mature stem defoliated.
- Fig. 2. Same. A younger stem partly defoliated.
- Fig. 3. Same. Base of two young stems showing increasing space between the nodes.
- Fig. 4. A young shoot with leaves, showing several fertile nodes.
- Fig. 5. A stem showing one fertile and three abortive nodes.
- Figs. 6 and 7. Young shoot, after Sir W. J. Dawson.
- Fig. 8. Conical spike (apex of stem?)—All Natural size; No. 1 and 2 from the Sandstones between Beds 1 and 2 Hartt's section. Nos. 6 and 7 from the plant bed No. 1: Nos. 3,4,5 and 8 from Plant Bed No. 2. See p. 107.

- Fig. 9. Variety—Stem showing two nodes, one with fruiting scales the other with barren bracts, Natural size. From Plant Bed No. 1. Fern Ledges, Lancaster, N.B. See p. 109.

PLATE V.

- Fig. 1. *Annularia acicularis*, Dn. sp. Part of stem and two whorls of leaves
 Fig. 2. The same. A branch with leaves of the first and second rank from the node.
 Fig. 3. The same. A branch with leaves of the second rank, diminishing toward the tip of the branch. All of the Natural size and from Bed 1. at Fern Ledges, Lancaster, N.B. See p. 117.
 Fig. 4. *Palæostachya acicularis*, n. sp. Part of the spike. Natural size. From Bed 2. Fern Ledges, Lancaster, N.B. See p. 118.
 Fig. 5. *Asterophyllites lentus*, Dn. Part of stem with three whorls. Natural size.
 Fig. 6. The same. A leaf enlarged, the wider end is the base. Mag. $\frac{2}{3}$. Both after Dawson.
 Fig. 7. The same. The type in Natural History Society collection. Shows three whorls of leaves. Natural size. From Bed 2. Fern Ledges, Lancaster, N.B. See p. 112.

PLATE VI.

- Fig. 1. *Asterophyllites parvulus*, Dn. Part of stem with branch showing leaves of the second and third ranks. Natural size.
 Fig. 2. The same. Part of stem showing two whorls of leaves of the first rank, Mag. $\frac{2}{3}$. Both from highest shale bed in Dadoxylon Sandstone, Bar-rack Point, St. John. See p. 112.
 Fig. 3. The same. A variety of slender growth, showing leaves of three ranks on branches of different sizes. Natural size. From Bed 2. Fern Ledges, Lancaster, N.B. See p. 113
 Fig. 4. *Asterophyllites* (?) *fissus*, n. sp. Part of stem showing pseudonodes and leaves from two pseudonodes.
 Fig. 5. The same. Part of a young stem with two groups of leaves at a node. Natural size.
 Fig. 6. The same? Fruiting cone or terminal shoot. All of the natural size. From Bed 7? Fern Ledges, Lancaster, N.B. See p. 111.

PLATE VII.

- Fig. 1. *Annularia longifolia*, Brongn. mut. *Leavitti*. Part of stem showing four whorls. Natural size. From Bed (3) 200 feet down in Dadoxylon sandstone, Duck Cove, Lancaster, N.B. See p. 114.
 Fig. 2. *Annularia latifolia*, Dn. sp. Three whorls showing leaves of different sizes.
 Fig. 3. The same. Young shoot showing attitude of the leaves, and reduction in size toward the tip. Both Natural size. From Bed 2. Fern Ledges, Lancaster, N.B. See p. 115.
 Fig. 4. *Annularia latifolia*—*minor*, n. var. Part of stem showing three whorls of leaves. Natural size.
 Fig. 5. The same. Terminal branch showing the attitude of the leaves, reduced in numbers and size toward the tip. Mag. $\frac{2}{3}$. Both from Bed 1. Fern Ledges, Lancaster, N.B. See p. 116.

PLATE VIII.

- Fig. 1. *Calamites geniculosus*, n.sp. Part of stem near the base, showing a branch at a node with subordinate branches each forking dichotomously. Natural size. From Bed? Fern Ledges, Lancaster, N.B. See p. 99.
- Fig. 2. *Ramicalamus dumosus*, gen. et sp. nov. Stem with several branches. Reduced $\frac{1}{2}$ —No. 2 the main stem. No. 2b the branches.
- Fig. 3. The same. Part of a stem showing a node having several whorls of leaves; these leaves of different ranks and sizes. Natural size.
- Fig. 4. The same. A node seen from above, having several whorls of leaves, and an annulus at the upper whorl. Natural size. All from bed No. 1. more than 200 below the summit of the Dadoxylon sandstone at Duck Cove, Lancaster, N.B. See p. 105.
- Fig. 5. The same? An upper branch supposed of this species, showing two single whorls of leaves with traces of an annulus. Natural size. From Bed 1, Fern Ledges, Lancaster, N.B. See p. 106.

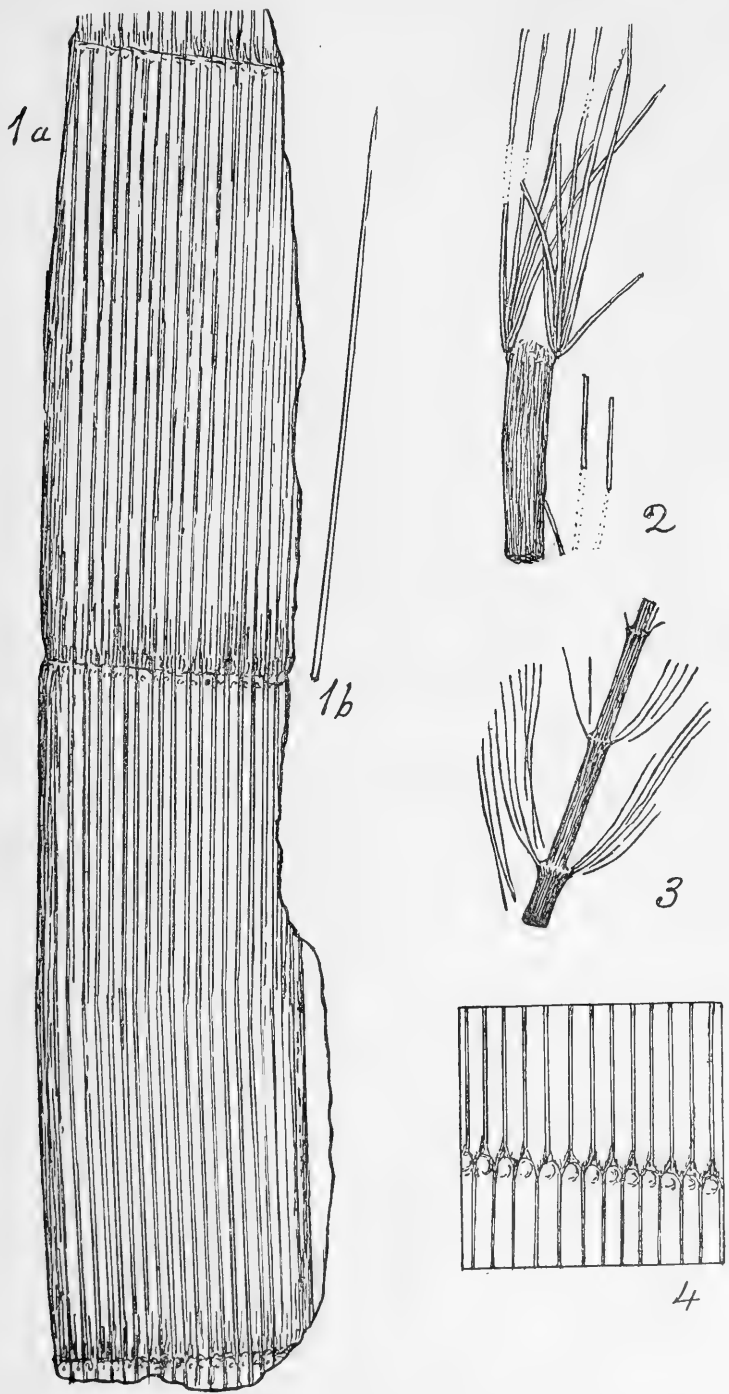


PLATE I.

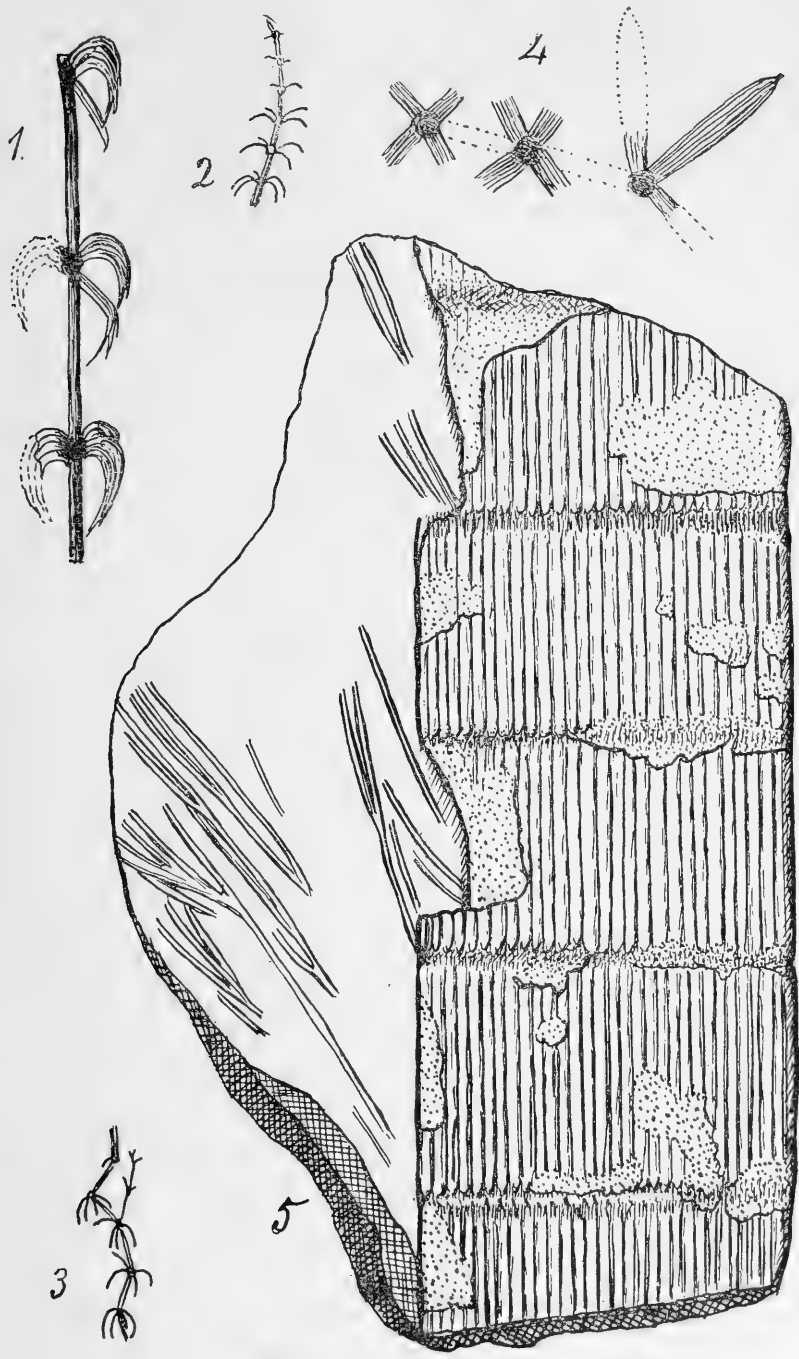


PLATE II.



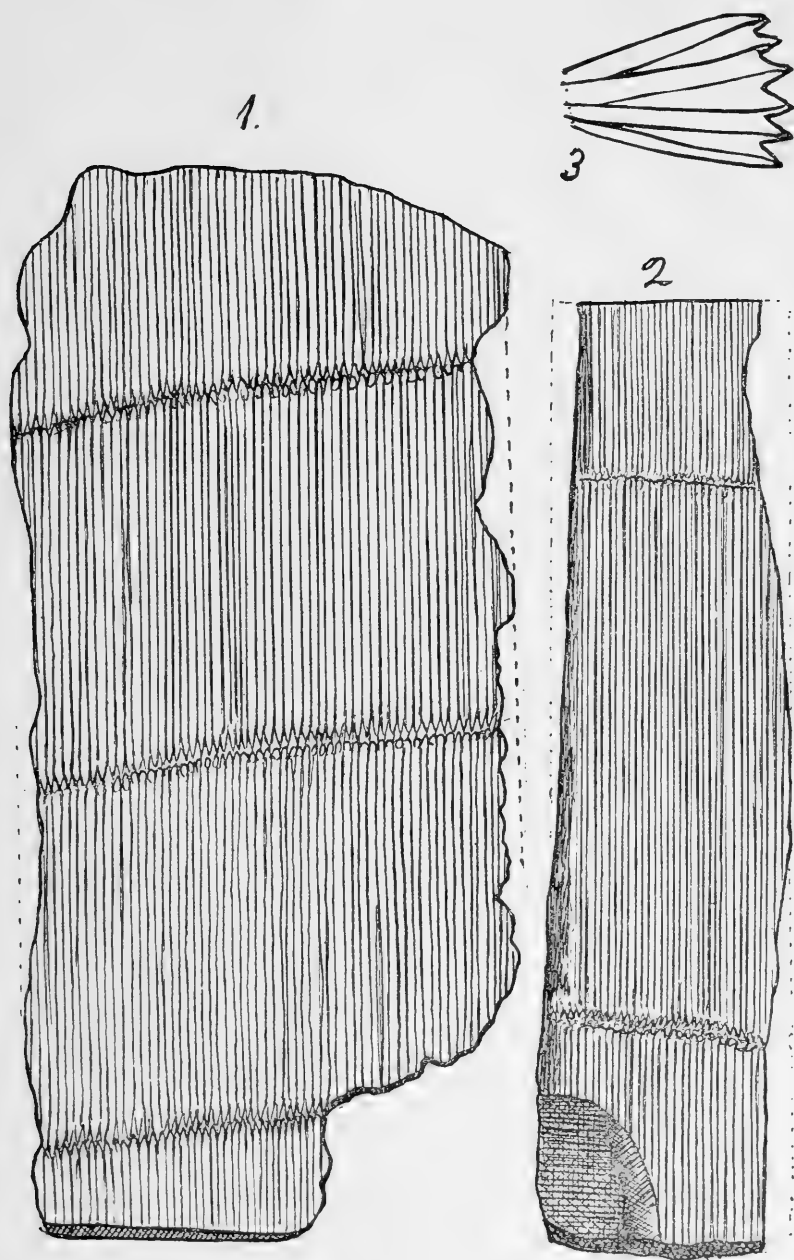


PLATE III.

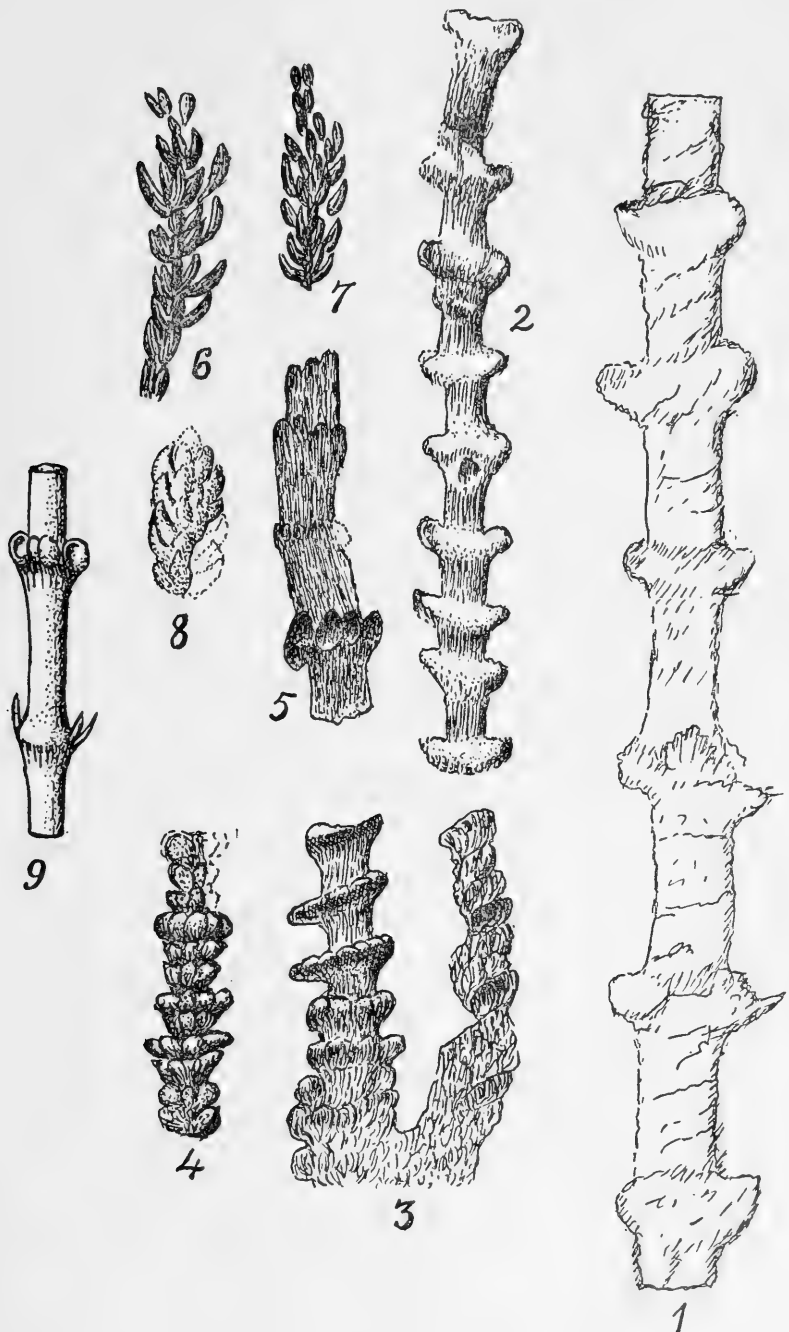


PLATE IV.

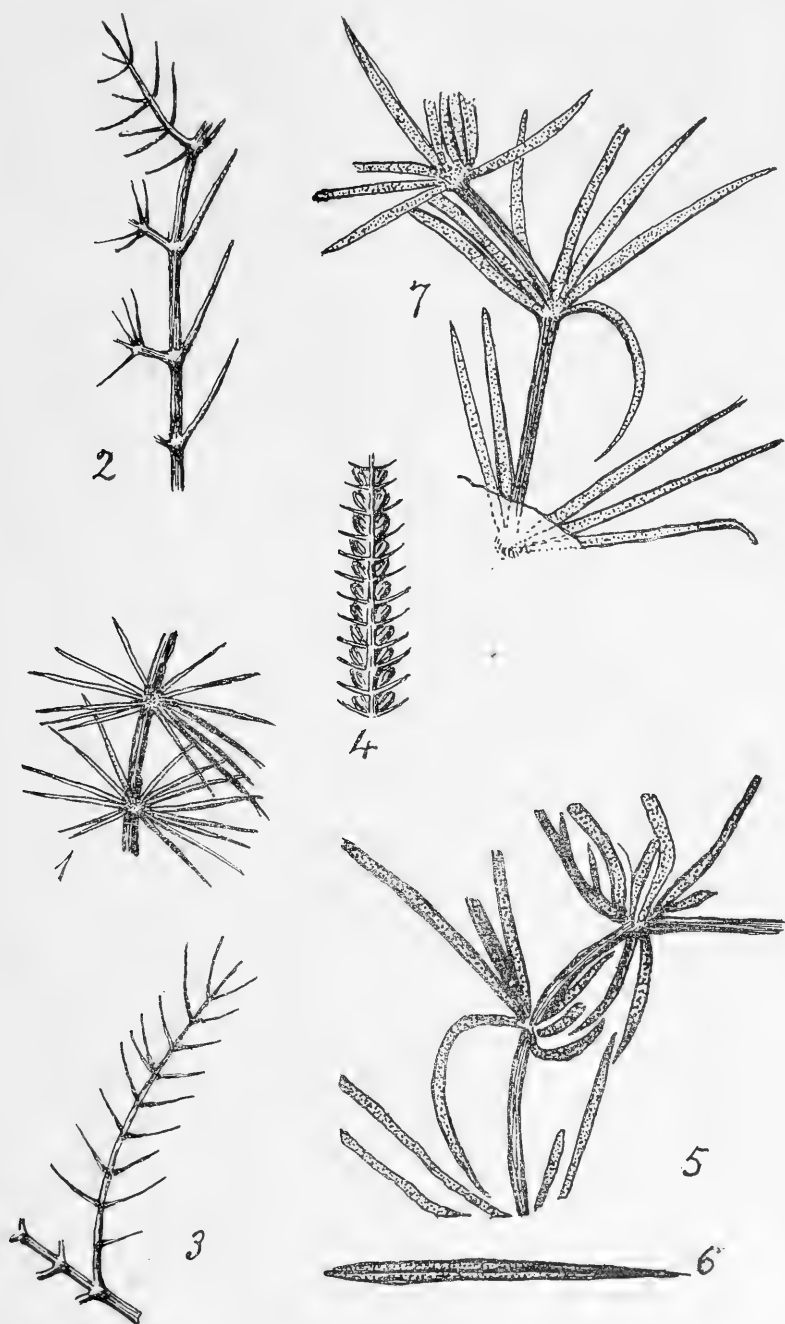


PLATE V.



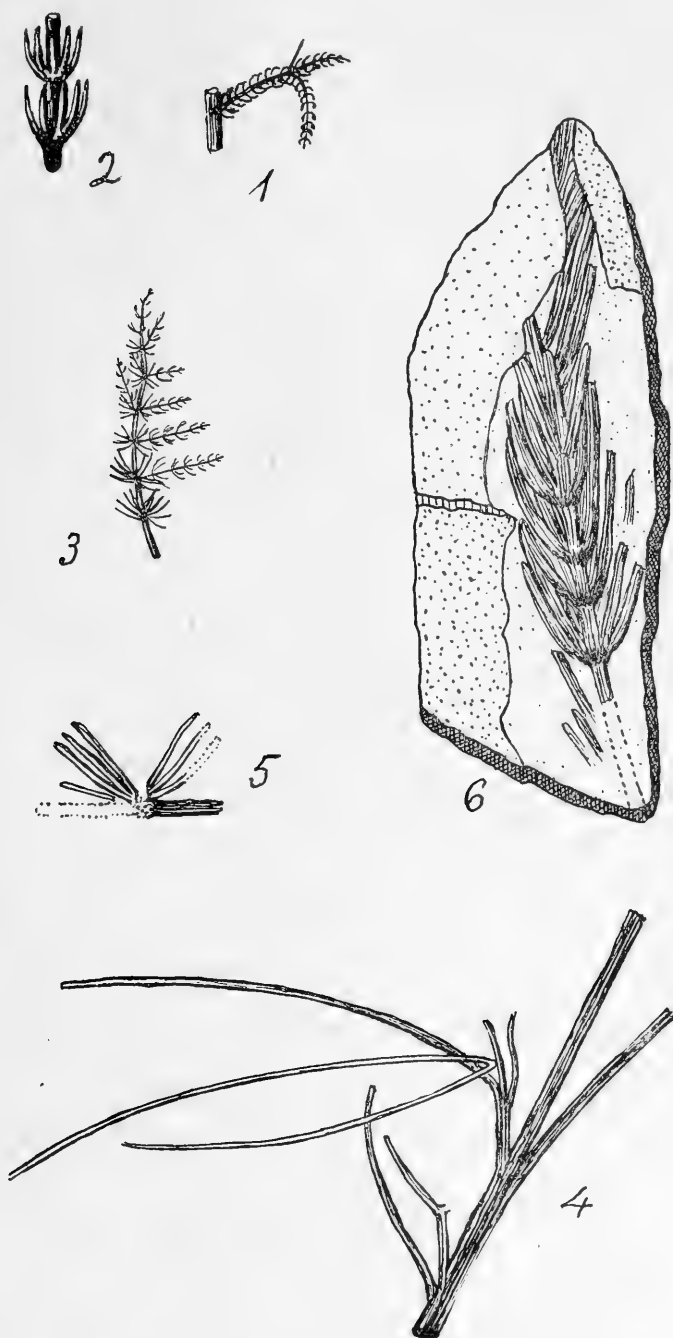


PLATE VI.

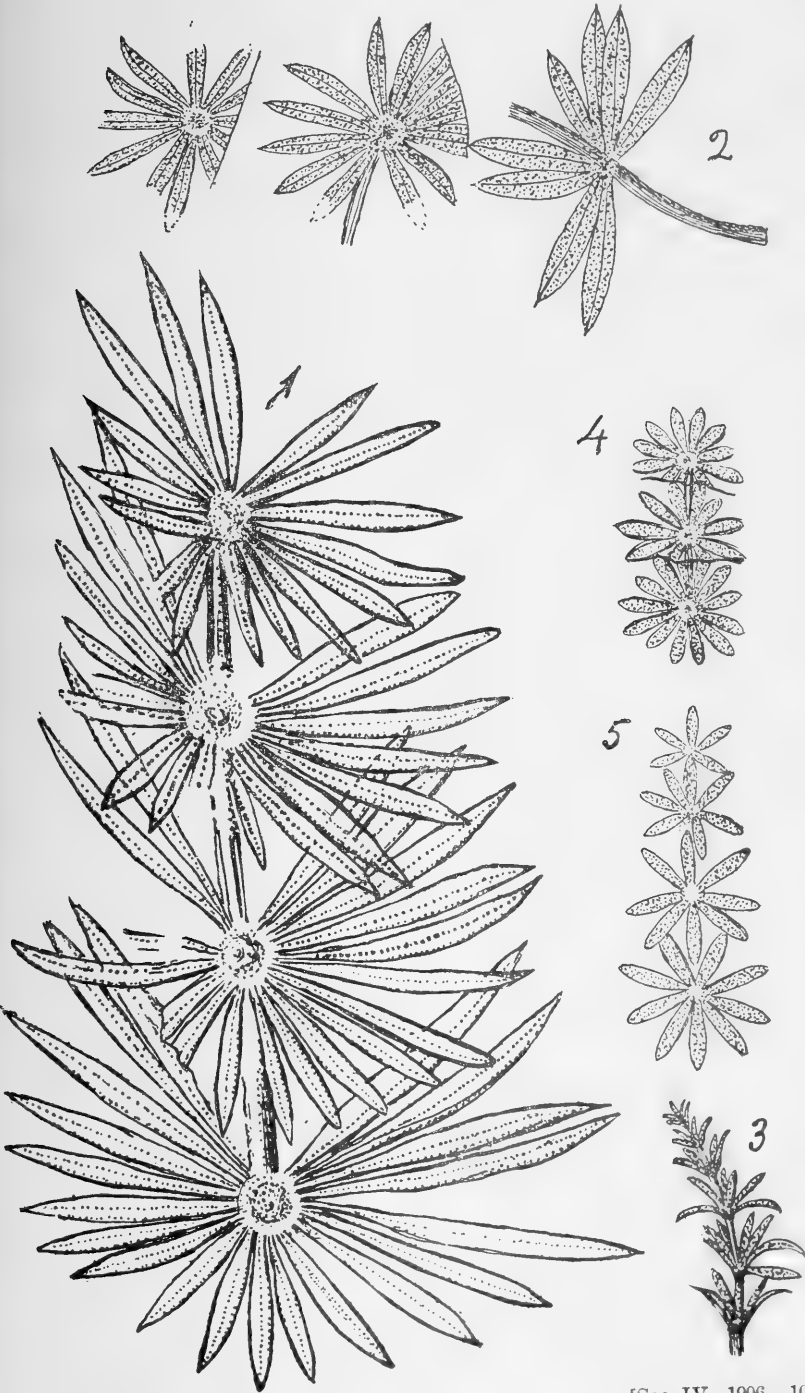


PLATE VII.

[Sec. IV., 1906. 10.

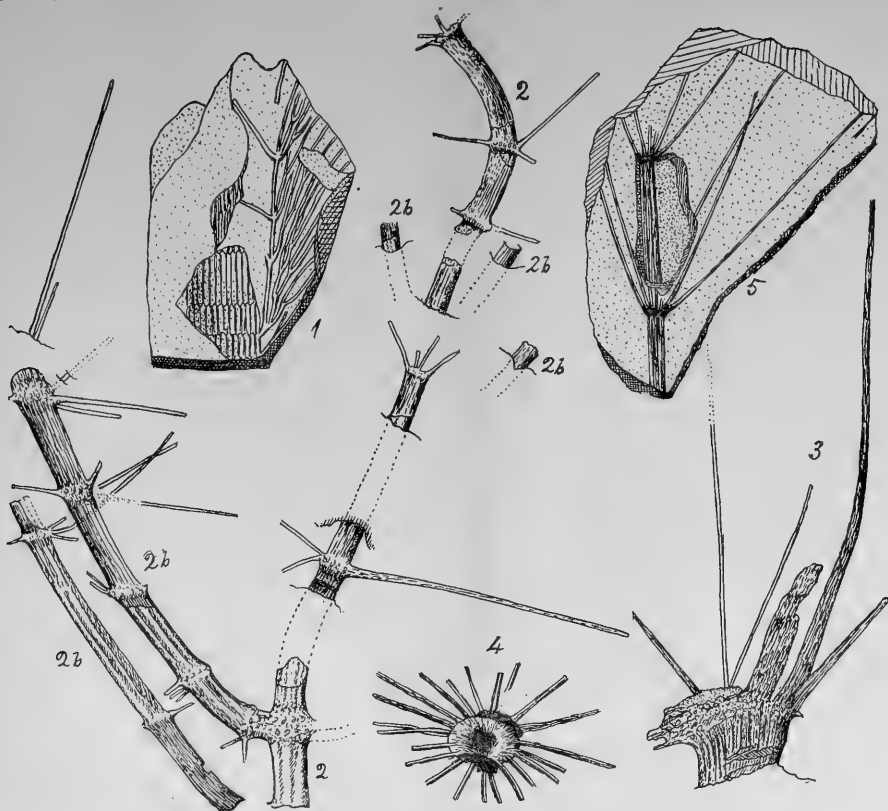


PLATE VIII.

XI.—On *Amyzon brevipinne*, Cope, from the Amyzon beds of the Southern Interior of British Columbia.¹

By LAWRENCE M. LAMBE, F.G.S., F.R.S.C.

Vertebrate Palæontologist to the Geological Survey of Canada.

(Read May 23rd, 1906.)

In examining, recently, some fossil fishes, from Horsefly river, B.C., presented to the Geological Survey by J. B. Hobson, Esq., C.E., of Vancouver, in 1895, the writer recognized a specimen of *Amyzon brevipinne*, Cope that throws additional light on the structure of this small species. The other specimens found by Mr. Hobson in association with this second known specimen of *A. brevipinne* belong to Cope's species *C. commune*, the characteristic fish of the Amyzon beds of Colorado.

The type of *A. brevipinne*, is from the North fork of the Similkameen river and was obtained, in 1888, by Dr. George M. Dawson, who submitted it to Professor E. D. Cope for determination. The original description appeared in 1894 in the Proceedings of the Academy of Natural Sciences of Philadelphia, vol. xlv, p. 401, without illustrations, and the fossil is referred to by Dr. Dawson in his "Report on the area of the Kamloops map-sheet, British Columbia," 1895 (Geological Survey of Canada, annual report, new series, vol. vii, p. 76 L, 1896). From the beds in which the type of *A. brevipinne* was discovered Dr. Dawson also obtained in 1888 a scale that is apparently referable to *A. commune*, Cope, and of which no mention has hitherto been made.

Other fossils from the North fork of the Similkameen obtained by Dr. Dawson are plants and insects which have been described by Sir J. William Dawson² and Dr. S. H. Scudder³ respectively. These remains are from the shales in which the type of *A. brevipinne* was found.

On the evidence of the plants and insects the age of the Similkameen beds is not definitely determined; the general conclusion points to the age as late Eocene or early Miocene.

¹ Communicated by permission of the Director of the Geological Survey of Canada.

² Trans. Royal Society of Canada, vol. viii, section iv, 1891, p. 75.

³ Geological Survey of Canada, Contr. to Can. Palæont., vol. ii, part 1, Canadian fossil insects, 1895.

Cope, in his description of *A. brevipinne*, and on the evidence of this vertebrate, assigns the age of the Amyzon beds of Colorado and Nevada to the Similkameen beds.

Dr. George Dawson in his report (p. 76 B) concludes that the Similkameen beds "are probably of Oligocene (later Eocene) age"; this on the evidence of (1) the plants which Sir J. William Dawson regarded as referable to the Oligocene or Lower Miocene, and of (2) the insects (all of which, except one, were new species) and of (3) the fish *Amyzon brevipinne* on which Cope based his correlation.

The discovery of a second specimen of *A. brevipinne*, this time in association with a well known species of Amyzon, viz., *A. commune*, Cope, a species distinctive of the Amyzon beds, is of importance, as it points to the probable equivalency of both the Similkameen and Horsefly beds of British Columbia with the Amyzon beds as developed in Colorado and Nevada.

Unfortunately, the age of the Amyzon beds in the typical localities has not been definitely settled. Cope, in 1884, in his "Tertiary Vertebrata," p. 742, expressed himself as doubtful whether they belong to the Eocene or Miocene series. Later, in 1891, William B. Clark¹ placed them as low down in the geological scale as the middle of the Eocene.

In 1894 Professor Cope pointed out that with the discovery of *A. brevipinne* the Amyzon beds were extended beyond the then known limits of South Park, Colorado and Osino, Elko county, Nevada. We can now add the fourth and much more northern locality of Horsefly river, B.C., which enters the west end of Quesnel lake from the south.

The original description of *A. brevipinne* is as follows:—"Form, medium; depth of body equal length of head. Fin radii; D. 22-3; A. 8; V. probably 11, an interruption in the order of the rays making the location of these rays uncertain. Seventeen vertebræ may be counted anterior to the caudal region, of which 10 are anterior to the anterior base of the dorsal fin. Space for two additional vertebræ exists at an interruption of the dorsal series, so that the total number of precaudal vertebræ is probably nineteen, as the dorsal fin is uninterrupted. Distal caudal vertebræ and fin absent. Pectoral, ventral and anal fins well separated from each other. Length anterior to caudal vertebræ, 57 mm.; length of base of dorsal fin, 23.5 mm.; depth at anterior base of dorsal fin, 25 mm. The species differs from those already described in the smaller number of dorsal fin-rays, and of dorsal vertebræ. The specimen on which it is based is of smaller size

¹ U. S. Geol. Surv., Correlation papers, Eocene, by William Bullock Clark, 1891.

than those of most of the other species, but some of the fragments of the collection indicate larger individuals."

In the type specimen the caudal fin is missing, a few rays only of the anal are partially seen and the pectoral is poorly preserved. The Horsefly river specimen is of about the same size as the type and is much more perfect, giving details of the structure of all the fins, the vertebral column and the scales.

The Horsefly specimen may be described as follows:—Body fusiform, four times as long as high, with the greatest depth at the anterior end of the dorsal fin. The head, including the opercular apparatus, is equal to one-fourth of the entire length, thus equalling the maximum depth. The anterior end of the dorsal fin is above a point midway between the front end of the head and the posterior end of the vertebral column. A line drawn vertically from the beginning of the dorsal fin passes midway between the distal end of the pectoral fins (when adpressed) and the proximal end of the ventrals. The pectoral fins are well preserved and are nearly as long as the ventral fins which equal in length the front rays of the anal. The rays of the dorsal fin are robust and long in front and rapidly decrease in size backward, being very short and slender at the posterior end. The front rays equal in length about two-thirds of the base of the fin whose outline behind is slightly concave. The caudal fin has equal lobes and is forked. The anal fin has rays that decrease in size rapidly backward, its base being equal to about one-half the length of the anterior rays; when adpressed this fin does not reach the caudal. There is a space between the posterior end of the base of the anal fin and the caudal greater than the length of the base of the anal by one-third. The ventral and pectoral fins are short-based and of nearly equal size, the former when extended backward falling short of the anterior end of the anal fin by a short distance, the posterior ends of the latter being equally in advance of the ventrals. There are about thirty-four vertebræ, of which about eighteen belong to the caudal region. Ribs, stout and very long. Neural and hæmal spines long. Numerous slender intermuscular bones, directed well backward, are preserved anteriorly above, and in the caudal region both above and below, the vertebral column. Cycloid scales cover the trunk. They are small, three occupying a space of about 3 mm. in a row measured obliquely upward and backward. Their exposed surfaces show fine concentric lines and (?) extremely minute, close set horizontal lines. The fin rays are branched and jointed. The interspinous bones (proximal pterygiophores) supporting the dorsal and anal fins are well developed, those of the anterior part of the dorsal fin reaching far

down between the neural spines. The dorsal fin has twenty-four rays, the anal twelve, each with an equal number of supports. There are about twelve rays to the ventral fins and fourteen to the pectorals. In advance of the ventral fin is a conspicuous, long, rather narrow bone, the basipterygium. The bones supporting the pectorals cannot be made out, nor are the bones of the head satisfactorily seen. Both fins of the pectoral and pelvic pairs are preserved in the specimen. The caudal fin is supported by eight hæmal and three neural arches. Of the former the posterior seven (hypural bones) are broadened in a vertical plane. A few rays appear to be attached directly to the posterior end of the urostyle on its lower side above the last hypural bone. The rays of the caudal are jointed throughout their length and branched distally. The lateral line appears to be represented above the vertebral column anteriorly by a double longitudinal series of faint, short, horizontal raised lines.

MEASUREMENTS.

Of specimen of *Amyzon brevipinne* from Horsefly river.

	MM.
Total length ($3\frac{1}{2}$ inches)	89
Length of head, including opercular apparatus	23
Depth at anterior end of dorsal fin	23
Depth at base of caudal fin	9
Length of anterior ray of dorsal fin	16
Length of base of dorsal fin	23
Distance of posterior end of base of dorsal fin from caudal	13
Length of anterior ray of anal fin	14
Length of base of anal fin	6.5
Distance of posterior end of base of anal fin from caudal	9
Length of ventral fin	12
Distance of base of ventral fin from anterior end of anal fin	16
Length of pectoral fin	13
Distance of base of pectoral fin from base of ventral fin	17
Length of vertebral column	48

The specimens from the southern interior of British Columbia in the Museum of the Geological Survey, pertaining to the genus *Amyzon* are:—

NORTH FORK, SIMILKAMEEN RIVER: obtained by Dr. G. M. Dawson in 1888.

Amyzon brevipinne, Cope, type specimen.

Amyzon commune, Cope: scale agreeing in size and ornamentation with scales of largest specimen of this species from Horsefly river.

NEAR TRANQUILLE, KAMLOOPS LAKE: obtained by Dr. G. M. Dawson in 1890.

Amyzon commune?, Cope: three fragments showing portions of the skeleton.

HORSEFLY RIVER: obtained by J. B. Hobson, Esq., in 1895.

Amyzon brevipinne, Cope: a specimen more perfect than the type and described and figured in this paper.

Amyzon commune, Cope: three specimens; the largest with the scales well preserved, showing all the fins, but with the head missing (figured in this paper); a second with the pectoral and dorsal fins and the supports of the ventral and anal fins preserved, but without the caudal fin and the anterior part of the head; the third lacking the head, but with the pectoral, ventral, anal and dorsal fins, and the base of the caudal fin, preserved. The second and third specimens show the scales and have the ribs, fin supports, intermuscular bones, etc., well defined.

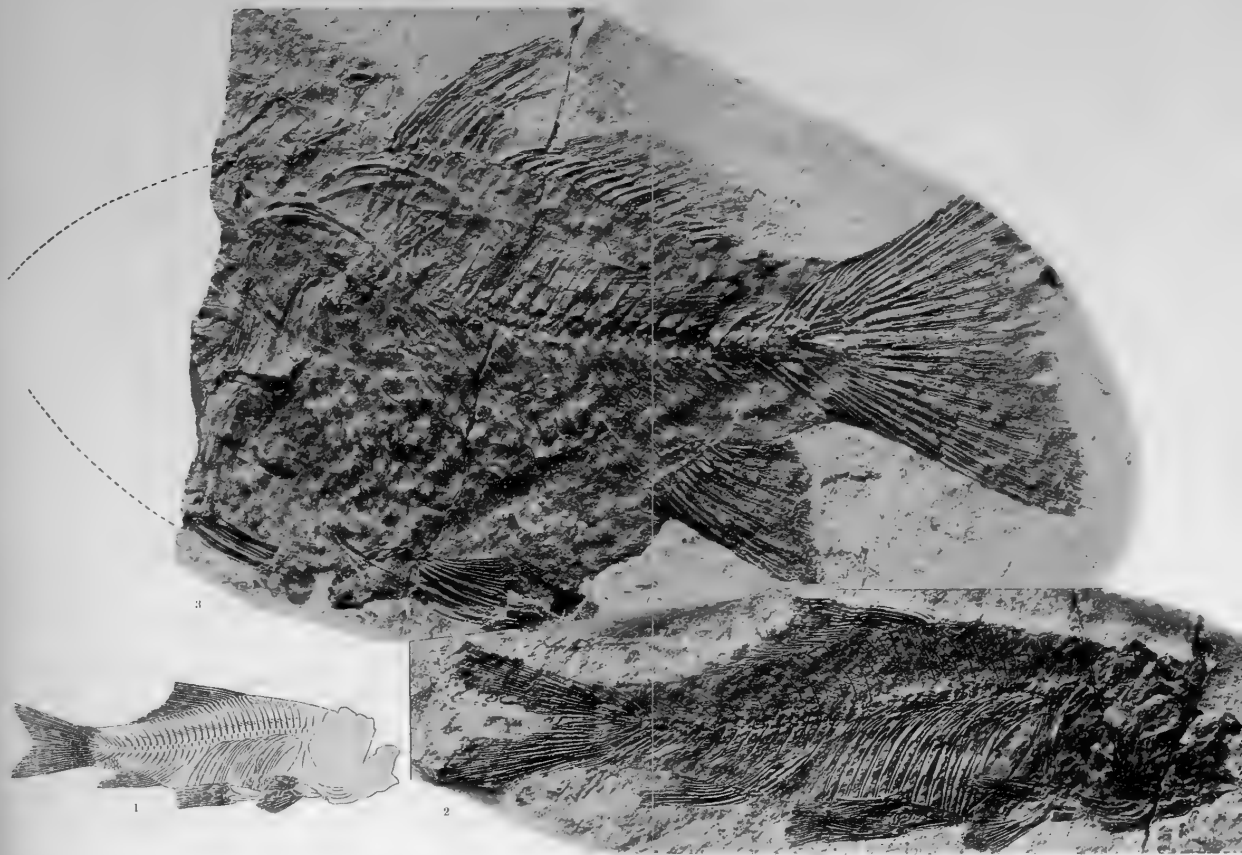
The finding of remains of *A. commune* in association with those of *A. brevipinne* in the Similkameen beds is a confirmation of the correctness of Cope's correlation of the Similkameen beds with the Amyzon beds of Colorado and Nevada, and the discovery of a fish fauna common to the Similkameen and Horsefly beds points to the probable synchronism of the fish-bearing beds of these two localities. The rocks near Tranquille, from which the other Amyzon remains were obtained, should also, with little doubt, be referred to the age of the Amyzon beds.

PLATE I.

Figure 1.—*Amyzon brevipinne*; specimen from Horsefly river, B.C., natural size.

Figure 2.—The same specimen reproduced from a photograph; twice the natural size.

Figure 3.—*Amyzon commune*; largest specimen from Horsefly river, reproduced from a photograph; natural size. The depth of the trunk, owing to compression, is exaggerated in the fossil





XII.—*The Nodule Organism of the Leguminosae—Its Isolation, Cultivation, Identification and Commercial Application.*

By F. C. HARRISON, Bacteriological Laboratories, The Macdonald College, Ste. Anne de Bellevue, Que.,

and B. BARLOW, Bacteriological Department, Ontario Agricultural College, Guelph, Ont.

(Read May 23rd, 1906.)

We shall endeavour to present in as brief a form as possible, the results of some two years' study on the nodule organism of the Leguminosae. This work was primarily undertaken from the economic standpoint, but a number of interesting scientific data were obtained, and are incorporated in this paper. The more practical aspects of the subjects have already been published as a bulletin by the Ontario Department of Agriculture, under the title of "Co-operative Experiments with Nodule-forming Bacteria" (Toronto, March, 1906).

The various subject headings of this paper are as follows:—

1. Occurrence of nodules.
2. Papilionaceae, from which *Ps. radiculicola* has been isolated.
3. Media for the culture of *Ps. radiculicola* and for the growing of legumes.
4. Isolation of *Ps. radiculicola*.
5. Colony formation.
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7. Morphology.
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10. Cultures of Leguminosae in flasks containing ash-maltose-agar.
11. Preparation and distribution of nitro-cultures.
12. Co-operative experiments.

1. *Occurrence of Nodules.*—We have examined upwards of thirty foreign economic species of Leguminosae of the sub-order Papilionacæ, exclusive of some twenty-four species and varieties of the genus *Vicia*, also a number of native species. Nodules were formed on the roots of all these with the exception of two species,—*Cicer arietinum* and *Galega officinalis*. The peculiar spongy white roots of *Galega* were examined by crushing and staining, but no bacteria were found, and there is, of course, the probability that the appropriate variety of *Ps. radiculicola* was not present in the soil.

No nodules were found on the roots of *Gimnocladus*, *Gleditschia* or *Cercis canadensis* belonging to the sub-order *Caesalpineae*, but mycorrhiza were present in all cases.

2. The following is a list of Papilionaceae from which *Ps. radiculicola* has been isolated:—

Trifolieae,—*Medicago sativa*, *Melilotus alba*, *Trifolium incarnatum*, *T. pratense*, *T. repens*.

Hedysareae,—*Desmodium acuminatum*, *D. canescens*, *D. nudiflorum*.

Vicieae,—*Vicia villosa*, *Lathyrus sativus*, *Pisum sativum*.

Phaseoleae,—*Glycine hispida*, *Apios tuberosa*, *Phaseolus vulgaris*.

3. *Media*.—Media are required for the bacteria and for the leguminous plants. It is desirable that these be common media, that is, serving at once for the growth of the leguminous host and the bacterial parasite. These media should be nitrogen free or nitrogen poor so as to introduce and compel the fixation of atmospheric nitrogen. In other words, they should be such as best to introduce the specific functional activity. It is well also in preparing media that the materials be few and easily available, and the processes be simple and rapid. The media used in these experiments meet these requirements and offer additional advantages.

Green plants and bacteria contain and require for their growth certain elements, and most of these elements are present in due proportion in the ashes of burned plants. For example, wood ashes contain phosphates, sulphides and chlorides of potash, soda, lime, magnesium and iron. Wood ashes contain no nitrogen. Water and air may be had free from combined nitrogen and they furnish the rest of the essential elements—oxygen, hydrogen and free nitrogen. Green plants get their energy for growth from the sunshine and the nitrogen fixing bacteria get their energy for growth indirectly from sunshine, when they are living within their host. When living independent of their host, a source of energy growth must be supplied the bacteria. Sugar affords such a force of energy and is free from nitrogen. Some of these relations are indicated in the table below.

Essentials for Growth.

Green plant alone.	Bacteria alone.	In association.
Wood ashes.	Wood ashes.	Wood ashes.
Water.	Water.	Water.
Air.	Air.	Air.
Combined N.	Sugar.	Sunshine.
Sunshine.		

Our medium record shows (see tabulated summary of media) that during the past two years we have made up some twenty-five lots of ash-maltose-agar, varying in amount from a few hundred cubic centimetres to 8,000 c.c. in a single lot. The larger lots were used for preparing nitro-cultures for distribution. We have also made seven lots of ash agar with sucrose or with sucrose or maltose and acid potassium phosphate.

Some twenty lots of liquid media have been prepared as follows:—Ash maltose water, 15 lots; ash sucrose water, 2 lots; ash water with sucrose or maltose and acid potassium phosphate, $\frac{1}{2}$ to 2 parts per 100, 5 lots.

Pseudomonas radicola from ten different species of Leguminosae have been inoculated and grown in most of these media, and notes have been kept of the cultures. Most of the cultures were isolated in the spring and summer of 1904 and have been kept in stock since that date.

Sugar-ash-water for Ps. radicola.—By referring to the tables of media, it will be seen that the materials and proportions have been varied. Maltose was found to be more favourable than dextrose or sucrose. Ashes from maple wood, from mixed beech and maple wood, from elm and from tamarack were found equally favourable. The ashes were obtained fresh and passed through a fine sieve—and sometimes reburned to consume remaining particles of carbon—and were then stored in glass jars until used. The distilled water was condensed on tin and stored in glass. Water from artesian wells was also used and was found equally favourable.

Methods of preparation.—The bacteria were found to grow as well, or better, in a filtrate from ashes as when the whole of the insoluble residue was retained and so a filtrate was generally used. For 1,000 parts of cold water take 2.5 to 25 parts by weight of wood ashes, shake together and filter at once or after half an hour; or heat together to boiling, boil a minute and filter. The filtrate should be almost colourless and more alkaline as the amount of ash and as the time before filtration is increased. To 1,000 parts of the filtrate add 5 to 20 parts of maltose, sucrose or dextrose, maltose being best; heat in flowing steam and boil a moment over the flame or heat in the autoclave for 20 minutes or more at 10 pounds steam pressure. The medium will vary from faintly alkaline to phenolphthalein to alkaline—6°, according to the amount of ash used. The colour will vary from a yellowish tint to a deep amber, being darker as more ash is used and as the amount of heating is increased. If desired, acid potassium phosphate, 2 to 5 parts per 1,000, may be added at any

stage of the preparation, but best, perhaps, after adding the sugar. The addition of this chemical makes the medium lighter in colour and strongly acid to litmus and to phenolphthalein.

A living culture of *Ps. radicola* will usually grow well in one or all of the following three liquid media, the preparation of which can be varied as before indicated. Such media can be sterilized in flasks and stored indefinitely.

To 1,000 c.c. of distilled water add 15 grams of wood ashes, heat in flowing steam, boil a minute and filter.

To 400 c.c. of the filtrate add 4 grams maltose.

To 200 c.c. of the filtrate add 100 c.c. distilled water and 3 grams maltose.

Heat these three solutions half an hour in flowing steam and boil a moment over the flame, or else heat for 10 minutes at 10 pounds steam pressure in the autoclave. Filter clear, tube each lot separately, and sterilize in flowing steam or in autoclave at 10 pounds steam pressure for 10 to 20 minutes.

Sugar-ash-agar for Ps. radicola.—The materials and methods of preparation are, in general, the same as for the liquid media except that agar is used in addition. The sugar may vary from 4 to 20 parts per 1,000, the ash from 0 to 50 parts per 1,000, the agar from 7.5 to 15 parts per 1,000, and the acid potassium phosphate may be omitted or used, from 5 to 10 parts per 1,000. It is best to filter the ashes from the water before adding the remaining ingredients and to dissolve the agar in the ash water before adding the maltose. If acid phosphate is added at all it should be only when 10 parts or more of ashes per 1,000 are used, and then after adding the maltose. In making up a series of agar media the several parts can be prepared separately in such proportions that, on mixing determined volumes and adding variable quantities of water, media will result having the desired compositions.

The three media of the following compositions were found favourable:—Water, 100 parts; maltose, 1 part; agar, 1 part; and the soluble portion of ashes, 1 part, 1.5 parts and 2.5 parts respectively, prepared as below.

Solution "A"—Water 100 parts, maltose 2 parts, agar 2 parts, heat together until dissolved.

Solution "B"—Water 100 parts, ashes 5 parts, boil and filter.

Solution "A."	Solution "B."	Water.
100	40	60
100	60	40
100	100	0

Heat each lot in steam and boil over the flame or heat in the autoclave at 10 pounds steam pressure, filter, tube and sterilize in steam, or in autoclave at 10 pounds steam pressure for 20 minutes to 5 hours. The media improve with age. Agar media filter slowly through filter paper, and we prefer to filter through absorbent cotton by means of a vacuum pump.

Agar media for Leguminosae.—Water-culture fluids were not tried, but other workers have stated that nodules are not formed beneath the surface of liquids. Crushed quartz with water-culture fluids did not fully meet all requirements. Gelatin media were found favourable for growth, but as gelatin itself is highly nitrogenous, it was unsuitable for experiments in nitrogen fixation. We then tried agar and found it suitable in almost every respect.

Ash-maltose-agar sufficient for 12 flask cultures of Leguminosae may be conveniently prepared as follows:—To 4,500 c.c. of distilled or tap water and 18 grams of wood ashes, heat in steam, boil one minute and filter through absorbent cotton by means of a vacuum pump or through filter paper. To 4,000 c.c. of the clear filtrate add 40 grams of agar and 16 grams of maltose, heat in steam until dissolved, boil a minute and filter as above. To each of 12 Erlenmeyer flasks of 1,500 c.c. capacity add 250 grams of the filtered medium, plug with cotton and sterilize in flowing steam one-half to one hour on each of three successive days, or better, in the autoclave at 10 pounds pressure for one-half to one hour. After sterilization, tie a piece of parchment paper, wet with mercuric chloride solution 1-1000, over the mouth of the flask, attach a card to receive data and weigh each flask. It will be seen that each flask contains approximately 250 grams of water, 2.5 grams of agar, 1 gram of maltose and the soluble part of 1 gram of ashes. As soon as the flasks are sterilized some sterile litmus solution may be added to some of them by means of a slender pipette thrust between the glass and the cotton. The medium remaining after preparing the 12 flasks may be tubed and used as a medium for *Ps. radiculicola* to furnish cultures for inoculating the flasks and for isolating the cultures from the nodules which develop. Such tubes are useful also in germinating the leguminous seeds.

The ash-maltose-agar in Erlenmeyer flasks has many advantages over quartz and water-culture fluids. It is true that the quartz medium may be made nitrogen free, but the seed itself is highly nitrogenous and the ash-maltose-agar is a nitrogen-poor medium, the 1 per cent agar containing very little combined nitrogen. The agar medium contains only 1 per cent of inert material, *i.e.*, agar; but the crushed quartz, if saturated, contains about 60 per cent by volume of inert

material, *i.e.*, quartz. The agar medium is transparent, so that the roots are at all times visible and growth and nodule formation may be observed from the start. The quartz is opaque and the roots cannot be seen except where they press again the sides and bottom of the flask. The agar medium is a firm jelly with a glossy surface and the growth of *Ps. radiculicola* can be measured or observed on the surface or as it accompanies the roots. Contaminations are easily detected, because of the formation of visible colonies. The quartz medium is a mixture that may be regarded as a liquid medium, yet the growth of *Ps. radiculicola* or any possible contamination cannot be directly observed nor detected. Both afford good support for root and stem; both are favourable for the growth of Leguminosae and for the formation of nodules. In the quartz medium, root hairs form in those portions which are not saturated, and in the agar medium root hairs form on roots which creep over the surface of the agar but are but little developed on roots which penetrate the agar.

Growing the plant within a glass flask affords several advantages and offers few technical difficulties. It makes possible the most rigid pure culture methods; it requires no attention beyond the initial preparation; that is, the medium does not require to be restored nor renewed, even during a period of growth of eight months.

In these flask cultures the plant is nourished as follows:—Sunshine, the energy for growth, comes through glass walls of the flask; the essential ash elements are supplied in the form of a filtrate from wood ashes, the oxygen, carbon dioxide and free nitrogen, pass in and out through the cotton plug in the mouth of the flask; water is abundantly supplied from the agar jelly, which consists of about 98.5 per cent water. The plant, being within the flask, the water of evaporation and transpiration is nearly all condensed on the glass and returned to be used over and over again. In other experiments where the stems and leaves were freely exposed to the outer air, the water of transpiration was lost and, consequently, the medium was soon exhausted. Before entering the host plant, the culture of *Ps. radiculicola* is nourished in like manner, but gets its energy of growth from the oxidation of the malt sugar supplied in the medium.

Tabulated Summary of Media. Stocks R 31 to R 50
Water 100

	AGAR NONE										AGAR 1 PER CENT									
	31	32	33	45	42	49	50	35	44	46	48	34	46.1	36	37	47				
Medium R.	1	1	1	1	1.5	1	2	1	1	1	2	1	1	1	1	2				
Ash. . . . .	..	..	..	2	..	1	1	2	2	1	2	..	..	2	0.5	1				
Maltose. . . . .	..	2	2	..	..	..	..	..	..	..	..	2	1	..	2	..				
Sucrose. . . . .	..	..	0.5	0.2	0.5	2	2	..	..	..	..	..	..	0.5	0.5	1				
KH ₂ PO ₄	-11°	-10°	+11°	+4°	Alk.	+28°	+28°	-5°	..	Neut	Neut	-5°	-.5°	+	+	+ 2°				
To Litmus.	-8°	-6°	+31°	+19°	..	+93°	+63°	-2°	..	Neut	Neut	-2°	-.5°	+	+	+ 18°				
To P'talein.																				

Tap Water 100

Medium R.	74	76	77	78	80	81	82	83	51
Agar.	1.5	1.2	1.5	1	2	1.5	1.2	1.2	0.75
Maltose.	2	2	2	1	1	1	..	.25	1
Ash. . . . .	.66	.66	.75	1	.5	1	.25	.25	.5
To Litmus.	Alk.	..	..	-10°	..	..	..	..	..
To P'talein.	Neut	-2°	Alk.	- 2°	..	..	..	..	..

Distilled Water 100.

Maltose. 1 per cent.

AGAR NONE			AGAR 1 PER CENT.		
Stock R	Reaction	Ash	Ash	Reaction	Stock R
52	+ 1°	0	0	+ 3°	53
54	+ 1°	0.5	0.5	— 2°	55
56	— 2.5°	1.0	1.0	— 2°	57
58	— 3°	1.5	1.5	— 2°	59
60	— 4.5°	2.0	2.0	— 2°	61
62	— 6°	2.5	2.5	— 2°	63
68	Faintly Alk.	0.5	3	— 8°	64
73	....	0.5	4	— 13°	65
79	....	0.5	5	— 21°	66
			<i>Agar 1.5 per cent.</i>		
			1	— 5°	69
			1.5	— 7°	70
			0.5	— 4°	71 tap W.
			1.0	Alk.	72 tap W.

ASH 1, MALTOSE 1, AGAR 1.			ASH—MALTOSE—WATER				
Water	Reaction	Stock	Water	Ash	Maltose	Reaction	Stock
100 tap	+ 1°	R 87	100 dist.	0.5	0.5	—0.5°	R 90
100 dist.	....	R 97	100 dist.	0.5	0.5	—0.2°	R 91
100 dist.	— 2°	R 98	100 tap	1	1	....	R 92
100 dist.	....	R 99	100 tap	1	1	....	R 93
100 dist.	....	R 100	100 dist.	1	1	Neut.	R 95
100 tap	Neut.	R 101	100 tap	1	1	....	R 96
100 tap	....	R 102					

4. *Isolation of Ps. radiculicola*.—The plant is dug and the roots washed under the tap, a nodule is removed with forceps, washed under the tap and immersed in about 20 c.c. of the following solution:—

- Hydrochloric acid, C. P. sp. gr. 1.20..... 2.5 c.c.
- Mercuric chloride crystals 1 gram.
- Water, distilled or tap 500 c.c., or 1,000 c.c.

The nodule sinks or floats, according to the species of plant from which it is obtained. In case it floats it must be held beneath the surface by means of a glass rod. It may remain immersed for 2 to 3 minutes, but not for more than five minutes if it is small. Large nodules like those from the Soy bean may remain in the solution for half an hour.

The nodule is then taken in flamed and cooled forceps and placed between folds of filter paper moistened with the same solution, which removes the excess of the solution. The nodule is then held with flamed and cooled forceps and a gash is cut in its side with a hot, chisel-edge knife-needle. This needle is made by sealing a short, stiff, iridium-platinum needle in a glass rod and hammering and filing the end to a chisel edge. The needle is again flamed and, when cool is thrust into the gash in the side of the nodule end and, by forcing it in, the nodule is broken open. The needle is flamed, cooled and thrust into the nodule in the middle of the broken surface. It is gently

rotated and a sensible quantity of the crushed bacteroidal tissue adheres to its point. The needle is then touched into a drop of sterile water in a sterile Petri dish until the water is turbid. The needle is thrust again into the nodule and touched into a small drop of water on a clean cover glass. In this way three cover glasses are prepared and spread, to be stained later. Each of several sterilized Petri dishes receives first a drop of sterile water and then the drop is inoculated with a loopful, or more, of the turbid suspension from the first Petri dish. The agar media, previously melted and near the temperature of solidification, are poured into the several Petri dishes in such a manner that the suspension and the medium are mixed throughout and yet somewhat unequally. Then the colonies which develop may be crowded in parts of the plate but will be well isolated in other parts. If desired, suitable gelatin media may be poured into some of the plates. These are interesting for study, but cultures for propagation and inoculation are taken from the nitrogen-poor agar plates only. When the media have solidified, the plates are marked and incubated at 20° C.

The films on the cover glasses are now fixed lightly in the flame and stained (see Staining reactions).

5. *Colony Formation.*—The colonies of the *Ps. radiculicola* in ash-sugar-agar media vary with the plant from which the cultures are made and with the composition of the media, yet they are characteristic. Colonies may appear in some plates in three or four days at 20° C., but the plates made from the same nodules at the same time, but in different media.

The deep colonies are circular, elliptical, or triangular with rounded corners. Elliptical colonies often present two opposite lateral-rounded outgrowths. The outline is sharply defined, but deep colonies sometimes appear as irregular patches. The colonies are granular, white by reflected light, and brownish by transmitted light. Deep colonies do not grow so large as surface colonies, but deep colonies may grow 1.5 mm. to 2 mm. long and half as wide. Submerged colonies may rise to the surface and then they take on the form and appearance of surface colonies, except that they show at the centre the form of the colony from which they arose.

The surface colonies are raised, round, wet, entire, shining and white. They appear like drops of melted paraffin, at first gleaming and transparent, then translucent, then gradually more turbid and opaque. At first they are watery, then more mucilaginous, and then may become so highly viscid as to draw out in long threads when touched with the needle. When the surface colonies become viscid the deep colonies do also. After surface colonies appear they grow steadily

for a long time, especially if well separated. Surface colonies may attain a diameter of 1 mm. to 2 mm. in five days, and 3 mm. to 4 mm. in fifteen days. After some weeks the period of active growth ceases, the colonies retain their general shape, but sink and become thin and flat on account of evaporation of the water from the mucilage in which the cells lie. Under the microscope, the surface colonies appear more finely granular than the deep colonies.

We have failed to detect the presence of any organism except *Ps. radicola* in leguminous nodules. Plate cultures from a nodule in special media and in ordinary gelatin and agar media of the laboratory, develop pure culture of *Ps. radicola* or else remain sterile. It is true that other colonies, mostly moulds, occasionally appear, but they are almost always surface colonies, although they are never numerous, and are not of the same kinds in plates from the same nodule. Further, we have frequently made streak cultures direct from the interior of nodules on inclined gelatin and agar media, and such cultures are negative or else develop pure cultures of *Ps. radicola*, according to the medium.

Isolation of colonies.—The needle is touched into a colony, then thrust into agar medium in a Freudenreich flask. Hanging drop and stain preparations are then made from the same colony.

6. *Growth of Ps. radicola on ash-maltose-agar.*—The medium may be allowed to solidify while the tubes or Freudenreich flasks are standing upright and later are inoculated by thrusting the needle into the middle of the agar. In two or three days at 25° C., there is raised, circular, transparent, wet-shining growth spreading on the surface from the point of inoculation, and a filiform growth along the needle puncture. This filiform growth increases and many fine filaments may radiate from it horizontally in the agar. These filaments are shorter toward the bottom.

The surface growth increases, but maintains its sharp circular outline, and in four to twelve days spreads over the whole surface of the agar as a white, partly transparent, thick, mucilaginous or slimy layer, with a wet-shining surface. The growth usually draws out in a fine thread when touched with a needle. In favourable media the growth is copious and in seven days may increase to a depth of 6 mm. over a surface of 10 mm. in diameter. After some months, this layer is thinner and denser according to the evaporation from its surface, but in Freudenreich flasks, or in tubes sealed with sealing wax, there is little change. Cultures on ash-maltose-agar in Freudenreich flasks remain alive for more than a year at room temperature (see viability).

On streak cultures, on inclined ash-maltose-agar, in two or three days there is a moist, shining, transparent growth along the line of inoculation. As this growth increases, it is transparent at the edges, becoming gradually translucent, then white and opaque towards the middle. It is at first watery, then mucilaginous, and it flows down the inclined surface of the agar by its own weight, and accumulates as a white, slimy growth at the bottom. It spreads laterally and forms a broad band or may cover the whole surface of the agar. At room temperature growth is a little slower, but otherwise as at 25° C.

Growth in ash-maltose-water media.—In January, 1905, a series of liquid media were inoculated with pure cultures isolated from nodules of red clover, alfalfa, vetch, bean and soy bean. The inoculated media were kept at 25° C. and observed daily, and the following conclusions were drawn: Some growth takes place in distilled water with 1 per cent of maltose, but such a medium is not favourable. The liquid becomes turbid, sediment forms which is not ropy but which diffuses on shaking, and a thin, wide ring of growth forms on the glass downwards from the surface. Media made in the manner already described, with distilled water, 100 parts; maltose, 1 part; and ashes, $\frac{1}{2}$, 1 and $1\frac{1}{2}$ parts respectively, and varying from neutral to alkaline —3°, are parts respectively, and varying from neutral to alkaline —3°, are favourable. Growth begins usually in three or four days and increases visibly for fifteen days. The liquid becomes turbid and the turbidity continues and increases to a thick white layer. On shaking with a circular motion, this growth rises in the liquid and twists or coils on itself. It is not easily diffused by shaking, and again settles down when left standing. There may be strings of slimy growth suspended on the body of the liquid. A ring of growth appears on the glass in usually nine or ten days just beneath the surface of the liquid and gradually increases to a thick, slimy ring which may break in pieces and fall to the bottom and again form at the surface. A partial film may form.

Media made with distilled water, 100 parts; maltose, 1 part; and ashes, 2 parts and $2\frac{1}{2}$ parts, respectively, are less favourable. The body of the liquid remains clear and a slimy white growth takes place at the bottom in fifteen days or more.

In larger flask cultures, a ring forms and an especially copious growth spreads over the surface. From the lower side of this mucilaginous film many delicate slimy filaments hang down some of which reach and unite with the copious slimy sediment.

7. *Morphology of Ps. radicola.* The cells from colonies are minute or small rods, single or in twos, often swollen at one end or near the

middle, often bent, more rarely branched. They are swiftly and actively motile, darting, whirling and tumbling. In young colonies nearly all the cells are motile, in older colonies fewer, and as long as the colony continues to grow some motile cells may usually be seen. The cell contents are not uniform, but denser protoplasm appears in plates and bands, as in the branched cells direct from the nodule. This can be observed in the living cells, but is best seen on staining. In this manner, several surface colonies and as many deep colonies from each plate are isolated and studied and the growth from each colony will be like that from the others on the same media. Colonies developed in plate cultures from pure cultures kept in stock as readily as from the nodules and they are the same in appearance.

The morphology of the bacteria taken directly from the nodules varies with the species of legume, the conditions of infection and growth, the age and size of the nodule, and the portion of the nodule examined. These bacterial cells are so characteristic, so varied and so beautiful in form as to be pleasing objects of study. In plants of the tribes *Phaseoleæ* (see photographs 6, 17, 23) *Hedysareæ* and the *Genisteæ*, the bacteria are mostly small rods with comparatively few branching and irregular cells. In plants of the tribes *Trifoliæ* (see photographs 1, 2, 3, 4, 5, 8, 9, 10, 13, 15, 16) and *Vicieæ* (see photographs 12, 13, 14, 18, 20, 21, 22), branching in irregular forms prevail. The simple rods generally but not always prevail in young nodules and in small nodules, whereas branched and irregular forms are more often observed in older and larger nodules. The proximal part of the nodule, the part first formed, may contain simple rods mainly, and the distal part, where growth is taking place rapidly, may contain simple rods and many branched and twice branched forms. Where general infection of the leguminous crop occurs, the bacteria may be mostly rods or mostly branched forms the same as in nodules (see flask cultures and photograph 22).

Hanging drop preparations from pure cultures on agar and liquid media have been observed at different stages of growth. From agar cultures the cells are short or longer rods, mostly single but some are joined end to end in twos with rounded ends, often larger at one end, often bent or curved or swollen at the middle. Internally, the protoplasm is seen to be of unequal density and shows bands or plates of denser protoplasm with more transparent portions between. The cells are swiftly and actively motile, darting, whirling and tumbling; they are especially active from young cultures and when the hanging drop is first made. In preparations from older cultures, fewer motile cells are seen, but some may be seen in motion as long as the culture shows any increase in growth.

The heavy ring of growth at the surface and also the film consists of small rods bound by the mucilage which they excrete. When a piece of growth is teased in water and examined, some swiftly motile cells are seen and some rotate slowly or rapidly without liberating themselves from the entangled slime. (See photograph 34).

The turbid liquid from the body of the culture shows some swiftly motile cells and others not in motion, also cells of irregular form, elongated, bent or curved with one end swollen or forking. Twice and thrice branched cells occur (see photographs 26 and 33). Extravagant forms with the branches swollen or elongated are not infrequent (see photographs 29 and 34).

The slimy sediment consists of cells entangled in a mesh of slime threads. Small rods occur but branched and irregular forms usually prevail.

8. *Staining Reactions. Flagella Stain.* Take a loop of the mucilaginous or viscid growth from an agar culture two days to several months old and spread it on a clean slide, lashing it out in slender tongues, let the film dry in air without killing or fixing, flood the film a moment with a saturated alcoholic solution of gentian violet, wash under the tap, dry between folds of filter paper and examine with the oil immersion lens. The mucilage in which the cells lie will be found deeply and evenly stained and the bacteria scarcely stained at all, so that the preparation presents the appearance of a photographic negative. The unequal density of the protoplasm of the cells is clearly seen, as indeed it is in the living cells when examined in a hanging drop. (see photographs 27 and 31).

The single polar flagellum is clearly demonstrated by this stain since it, like the protoplasm of the cells, refuses the stain, and so it appears as a clear or uncoloured streak in the surrounding, deeply stained, mucilage. The flagella are best seen at the margins of the film and in thin places. (See photographs 27 and 31). In parts of the film where the culture is thickly spread, the mucilage is intensely stained and the flagella being slender and enveloped deeply in the mucilage, are not distinguished. In these parts, however, the cells are beautifully contrasted with the dark background and their internal structure is clearly shown. Saturated alcoholic solution of methyl blue, night blue or fuchsin may be used in place of saturated alcoholic gentian violet. A film prepared and stained as above, then flooded an instant with Lugol's solution, is still more intensely and darkly stained.

Young agar cultures stain well with carbolic fuchsin. The mucilage is not deeply stained, but the cells take the stain well and show the irregular density of their protoplasm by its banded appearance. If the

film is killed and fixed before staining, the mucilage shrinks away from the cells, leaving a narrow clear space, giving an appearance as if the cells were capsulated.

A Stain to demonstrate the nature of the Mucilage. Spread a loopful of a mucilaginous culture from agar or from a liquid culture on a slide, dry in the air, flood an instant with water, and immediately flood with some stain as gentian violet or fuchsin. The mucilage of the air-dried film takes up water and when the stain is added the mucilage contracts and assumes certain patterns or figures composed of bands and strands of fine and coarser, intricately interlaced filaments. These are sometimes arranged in wreaths like smoke in form and sometimes in quite regular hexagonal figures, (see photographs). The bacterial cells are assembled along the slime threads and correspond in numbers to the thickness of the slime thread on which they lie. They take the stain, (see photographs 28 and 30).

Kiskalt's Amyl-Gram Stain. This is the same as Gram's stain except that amyl alcohol is used as a decolorising agent instead of ethyl alcohol. *Ps. radiculicola* is quickly decolorized by Gram's method, but stains deep violet by Kiskalt's stain. This stain is applicable to all cultures of *Ps. radiculicola* and is useful in making preparations for photography from liquid media and especially from the nodules, since the amyl alcohol clears up the background, brings the bacteria into prominence, and exhibits their internal structure. (See photographs 15, 16, 26, 32, 33, 34).

9. *Viability of Pseudomonas radiculicola.* Some observations on the viability of *Ps. radiculicola* on agar and in liquid media are collected in the following table. The cultures were grown a short time at 20°C or 25°C and were then kept at the temperature of the laboratory. These same cultures were all successfully transferred to various other media more than once in the interval record in the table, and gave a prompt and characteristic growth in favourable media. The transfers recorded in the table were to ash-maltose-agar in all cases and also to ash maltose water in some cases. The growth, morphology and staining reactions were carefully observed and were characteristic of *Ps. radiculicola* as elsewhere described. The same is true of colonies which developed in plate cultures in ash-maltose-agar made from certain of these cultures, after a lapse of nearly a year and eight months in one case. The limit of viability of these culture is not yet known, but this organism will probably live more than two years on favourable agar and in favourable liquid media. The longest time here recorded is two years all but five days.

The growth was abundant and mucilaginous, the cells were actively motile in hanging drops; stained with alcoholic gentian violet they showed single polar flagella. Occasionally branched forms were seen from agar cultures and were frequent in liquid media.

Viability of Pseudomonas Radicola in Cultures at Room Temperature.

ISOLATED FROM	CULTIVATED IN WATER 100% WITH					ALIVE AFTER		
		Ash %	Maltose %	KH ₂ PO ₄ %	Agar %	Years	Mos.	Days
White Clover.....	R 35	1	2	0	1	1	11	25
(Trifolium repens).	R 36	1	1	0.5	1	1	5	28
Red Clover.....	*R72	1	1	0	1.5	0	11	8
(Trifolium pratense)	R 36	1	1	0.5	1	1	4	2
	R 72	1	1	0	1.5	1	0	29
Alfalfa.....	R 34	1	0	0	1	1	10	27
(Medicago sativa)..	R 34	1	0**	0	1	1	7	2
	R 54	0.5	1	0	0	1	1	17
	R 54	0.5	1	0	0	1	7	19
Vetch.....	R 44	1	2	0	1	1	10	3
(Vicia villosa),....	*R44	1	2	0	1	1	7	25
	R 54	0.5	1	0	0	1	3	20
Flat pea.....	R 35	1	2	0	1	1	9	15
(Lathyrus sativus).	R 35	1	2	0	1	1	7	26
Pea.....	R 36	1	2	0.5	1	2	0	1
(Pisum sativum)..	R 36	1	2	0.5	1	1	9	5
	R 45	1	2	0.2	0	0	9	18
	R 60	2	1	0	0	0	9	19
Bean.....	R 35	1	2	0	1	1	7	10
(Phaseolus vulgaris)	*R35	1	2	0	1	1	4	20
	R 35	1	2	0	1	1	6	26
	R 46	1	1	0	1	0	10	22
Tick Trefoil.....	R 35	1	2	0	1	1	8	29
(Desmodium nudiflorum).....	R 45	1	2	0.2	0	1	2	28
Wild bean.....	R 35	1	1	0	1	1	4	32
(Apios tuberosa)...	R 36	1	2	0.5	1	1	8	29

* Plate cultures were made from this culture, and cultures made from the plate were distributed as nitro-cultures in 1906.

** Sucrose 2%.

10. *Cultures of Leguminosæ in flasks containing Ash-maltose-agar.* Various means were tried in order to kill the bacteria and moulds on leguminous seed without killing the seeds. The agents employed alone and in combination with dry heat, moist heat, sulphuric acid, and calcium hydrate, formalin, and mercuric chloride,—but only in a few instances were living seeds obtained free from living bacteria, never when the seeds were first inoculated with spores of bacteria. The seeds either refused to germinate after treatment or else after germination they proved to be still infected with bacteria. We then gave up trying to kill bacteria when these were already present and found a way to get seeds free from bacteria.

The pods were picked from the plants and such were selected as were sound, well-filled and mature, but not yet dry. The pods were washed and immersed in mercuric chloride solution, 1 : 1000, for an hour or more, then placed between folds of sterile cotton. A pod was held in forceps and passed through the flame on all sides and the ends were well burnt. With flamed forceps the pod was opened and the seeds placed between folds of sterile cotton. After a few days the seeds were dry and they were then taken in flamed forceps and put in test-tubes which had been plugged with cotton and sterilized. The tubes of seeds were then kept at room temperature until used.

Seeds were thus obtained in the summer of 1905 and 1906 from pea, vetch, bean and soy bean. These seeds were examined for bacteria by plating some of them in ordinary gelatin or agar media and in ash-maltose-agar and by dropping some into tubes of sterile bouillon. The seeds so treated imbibed moisture and in some instances germinated. Some of these cultures were kept for weeks, yet remained sterile and free from bacteria and fungi. Plate cultures showed occasional colonies, mostly moulds from the air, but occasionally the seeds contained living bacteria. This occurred more often with seeds which were discoloured or infested with weevils, or which came from broken or diseased pods.

*Germination of the Seeds.** From one to three seeds were dropped into about 3 c.c. of boiling sterile water in a test tube. The tubes were immediately cooled and incubated at 37°C and then at 25°C until the seeds germinated. After the first 24 hours, the tubes were so inclined that the seeds were only partially in the water. Most of the pea and vetch seeds germinated in three days, but the beans did not germinate so well. The water in the tubes remained clear and bright and free from bacteria, except in an occasional tube in which the liquid became very turbid and contained bacteria, sometimes small and slender rods and at other times large, motile bacilli in chains. The seed germinated well in a tube of ash-maltose-agar prepared as for the growth of Legu-

minosæ (see media). After three days the seeds were kept in the diffuse daylight of the room, and after five days or more the seeds which had germinated and which were found free from bacteria were planted in the flasks of ash-maltose-agar, prepared as elsewhere described, the plug was removed from the test-tube, the mouth of the test-tube was flamed, and the liquid, if any, was poured away. The plug was then removed an instant from the mouth of the flask containing the ash-maltose-agar and the germinating seed was shaken from the test-tube into the flask, and the plug was re-inserted into the mouth of the flask. The parchment paper was tied in place over the cotton plug and the flask weighed and set aside in diffuse daylight in the laboratory. A number of flask cultures were prepared in this way on the same day and were kept some days before any were inoculated in order to observe possible contaminations. Some of the flasks were then inoculated with a pure culture of *Ps. radiculicola* and some were kept uninoculated as controls. The flasks were usually kept in a greenhouse. At intervals the flasks were weighed to determine the loss of water by evaporation. The growth of the plant, both root and stem, was observed and measured through the glass and through the transparent medium. The presence or absence of contaminating fungi and bacteria was noted. The growth of *Ps. radiculicola* in the inoculated flasks, the first indication of its invasion of the living roots, the form and growth of nodules and the results on the root system were studied and recorded daily or at convenient intervals.

One series of flasks was kept under observation for eight months and three other series for shorter periods. A final examination of the flasks was then made, as follows:—

The medium was examined for micro-organisms by staining and by plate-cultures in ordinary agar and gelatin and in ash-maltose-agar. A nodule, if any were present, was taken from the roots with sterile forceps and plate cultures in ash-maltose-agar were made from it in the manner already described (see isolation of *Ps. radiculicola* from nodules). Stains were also made from this nodule and from others. The roots were examined by staining, and when a general invasion was observed, cultures were also made from the interiors of the roots so invaded. Control cultures in the flasks not inoculated were treated in a corresponding manner, stains and plate cultures being made from the medium and from the roots. The plant was then drawn out entire from the flask and the roots and stems were measured and sometimes weighed. In some cases nitrogen determinations were made from the medium and from the plants. The nodules were counted and weighed.

The loss of water by evaporation was found not to vary much in flasks of the same series. The average loss of seven flasks grown dur-

ing 146 days, each containing 250 grams of medium, was $\frac{1}{4}$ gram per day, at which rate the medium would be exhausted in 1,000 days. These flasks were simply plugged with cotton and the cultures were grown in a living room heated by steam. The loss was less from a series having parchment paper tied over the mouths of the flasks. In this case, the medium would have been exhausted in a little less than three years. The plants grew vigorously in the agar, especially at first; later, uninoculated plants gradually withered or even died as if from nitrogen starvation. The inoculated plants easily thrived as long as they were kept.

Contaminating bacteria and moulds sometimes appeared in the flasks a few days after the seeds were planted in them; these were without effect on the plant and were never observed to cause or interfere with nodule formation.

In all inoculated flasks nodules appeared usually in about a month. They were sometimes few and large, sometimes many and small; in one case as many as 70 developed on the roots of one plant. The nodules continued to increase measurably in size as long as the cultures were observed and were about the same form as seen on plants in the field, but occasionally larger. In the absence of root hairs, infection began as a small transparent spot in the root. Nodule formation and general infection of the root appeared to check extensive root formation. In all inoculated flasks growth of *Ps. radicola* was copious and characteristic, spreading as a thin layer over the agar and penetrating the agar along the roots so that each root was surrounded even to its growing tip with a cylinder of growth.

On final examination, *Ps. radicola* was found by stains and by plate cultures in the medium of the inoculated flasks and no other organisms were present, or in some cases moulds and other bacteria were found.

A general infection of the roots generally accompanied nodule formation.

The stains from the nodules showed that simple rods sometimes prevail and sometimes branched and irregular forms.

Nodules were never formed and root infection was never observed in uninoculated controls.

The presence of *Ps. radicola* was never detected by staining nor by cultures in uninoculated controls, where bacteria and fungi were absent or sometimes present in the medium, but never in the living roots.

The species on which nodules have formed in flask cultures on ash-maltose-agar are *Phaseolus vulgaris*, *Vicia villosa*, *Pisum sativum* and *Glycine hispida*.

Cross inoculations have not been observed. Pea and vetch growing in the same flask, which was inoculated with vetch culture, formed abundant nodules, and root infection occurred in the vetch, but the pea showed no infection whatever. *Ps. radiculicola* was isolated from the nodules on this vetch and plates from the peas were negative. The like was true of bean and pea growing in the same flask and inoculated with pea culture. Nodules formed on the pea only.

The notes regarding the growths of legumes in all our flasks are not given, but a few samples will suffice to give the necessary information regarding the inoculations, growth of plants and methods of isolation; and we wish to point out the value of this method to any one engaged in biological problems associated not only with legume bacteria, but also with the bacterial and fungus diseases of plants. All conditions are better under control and seem to us to offer advantages over the methods devised by Marshall Ward in his study of certain rusts.

Flask Cultures.—Seeds of *Vicia villosa* were taken from the pods under sterile conditions, July 2nd, 1904, and were distributed in tubes containing sterile water, December 29th, 1904. By January 1, 1905, eight seeds had germinated and all were free from bacteria. The water in the tubes was clear and stains from it were negative.

One seed was planted January 1, 1905, in each of seven 1,000 c.c. Erlenmeyer flasks containing each 200 c.c. of ash-maltose-agar, R51. The cotton plug was removed, the seed was dropped into the flask by means of flamed forceps and the radicle was pressed into the agar by means of a flamed and cooled glass rod. The plug was replaced in the mouth of the flask. The flasks were then kept in the window of a living room and on sunny days were protected by a piece of cheese cloth.

The culture used to inoculate flasks I, III and V was isolated from a nodule of *Vicia villosa* on July 6, 1904, in ash-maltose-agar R34, and a colony was transferred to R44, July 11, 1904. A single needleful of the growth on R44 was used to inoculate all three flasks January 7, 1905. In two days there was growth of the culture in the inoculated flasks. This growth increased rapidly and in eight days there was a copious, wet-shining, mucilaginous layer covering nearly the whole surface of the agar. This growth now began to accompany the growing roots, and from this time on every ramification of the roots was surrounded by a thin cylinder of bacterial growth. This growth penetrated the solid agar a little distance in advance of the growing root tips (see photographs 35, 36 and 37).

Flasks II, IV, VI and VII were not inoculated and no bacterial nodules appeared on the roots of these plants.

Flask I. On February 7, 1905, there were 10 nodules on the roots of plant 1. The largest was 2 mm. long. On April 22, there were 10 nodules, 8 large and 2 small, the largest was 2 x 8 mm.

Flask III.—On February 7, 1905, there were four nodules on the roots of plant 3. The largest was 3 mm. long. On March 11 there were eight nodules, three large and five small, the largest $1\frac{1}{2}$ x 5 mm. On April 22 there were eight nodules, the largest 2 x 4 mm. On May 31 there were eight nodules, the roots were otherwise smooth.

Flask V. On February 7, there were two nodules; March 11, five nodules; April 22, six large and four small nodules; September 25, six large and seven small nodules, also a general infection of the roots. The largest nodule was 26 mm. long. Nine of the roots were coiled at the tips. October 19th, the largest nodule was 30 mm. long and 2 mm. forked at the apex. A part of the nodule was green, having taken on chlorophyll. The largest nodule was examined by staining and only rods and no branching forms were found. Seven other nodules from this plant were examined. The bacteria were mostly rods, branched forms occurred but were infrequent. A stain from the agar showed numerous rods like *Ps. radiculicola*.

Contaminations in Flask V.—No bacterial contaminations were observed, but one mould colony developed by January 7th and gradually spread over most of the surface of the agar. No cultures were made from this flask.

Flask I, Nodule II, Plate Cultures May 31, 1905.—The nodule was immersed in mercuric chloride solution 1:1000 for one and one-half minutes and plate cultures were made from it in the usual manner. Typical colonies of *Ps. radiculicola* developed, which became viscid, drawing out in slender threads when touched with the needle. The cells were like *Ps. radiculicola*. A culture in ash-maltose-water from this nodule gave a characteristic growth and branched forms were numerous.

Plate cultures were made from the agar in Flask 1, May 31, 1905, in ash-maltose-agar R78 and R77. Numerous colonies like *Ps. radiculicola* developed in twelve days, also numerous red colonies of a small bacillus.

Flask II, not inoculated.—No nodules formed on the roots as long as the plant was observed. The roots became nodose or knotted by March 11th and continued so.

Plate cultures were made June 1, 1905, from flask II. These developed numerous colonies of a yellow diplococcus, but no colonies resembling *Ps. radiculicola*. Plate cultures in ash-maltose-agar R78 from one of the nodose roots gave numerous colonies of a yellow diplococcus but no other bacteria.

The swellings in the roots of this and other plants of this series were not bacterial nodules, and bacteria were not found in their cells as long as the plants remained alive. The outer tissues of the nodose parts of the roots were ruptured, especially the longitudinal walls of the cells which separated, exposing the inner tissue as columnar chains of cells. The bacteria which contaminated the cultures had to some extent lodged in these open spaces of the ruptured tissue, but their position here appeared to be only accidental. (See photographs 38 and 39).

Flask IV, not inoculated.—The plant began to decline after March 11th as if from nitrogen starvation, and by May 31st there was only a little life remaining. No bacterial colonies formed, but the roots became very nodose because of the internal swelling and rupture of the tissues. The flask was examined October 19th. There was a small bacillus present in great numbers and invading the decaying tissues of the root and stem. The bacilli were mostly joined end to end in pairs and did not resemble *Ps. radicicola*.

Flask VI, not inoculated.—No bacterial nodules appeared on the roots as long as the flask was observed until October 19th. The roots became nodose because of a swelling and rupture of the tissues. There were some living shoots up to September 25th. On October 19th the roots only appeared to be alive. On examination of the roots *Ps. radicicola* was not to be found.

Flask X, containing two pea seeds was inoculated September 12th, 1905, with a culture obtained from a nodule on *Pisum sativum*, which had been grown on artificial media one year and 199 days.

On December 12th, 1905, there was no bacteria visible in the medium, which was blue with the litmus, except just beneath the seed, there the medium had become acid. One of the plants had formed no roots and it afterwards died without forming any roots. The other plant had a stem 5 cm. long and a root 1 cm. long on December 12th.

The plant which lived had eight nodules February 11th, 1906, and 35 nodules on March 23rd. By May 7th there were 80 nodules. (See photograph 40, Flask 2, taken February 20th, which illustrates this flask culture).

On March 23rd, the only evident contamination was one mould colony. On that date the roots were vigorous, forming a closely tangled mass between the glass and the agar. The nodules were all small and almost round. The total weight on April 23rd was 430 grams, that is, there was a loss of 20 grams in 121 days, or less than .2 gram per day. At that rate the 250 grams of medium in the flask would have been exhausted in 1,250 days, or three years, five months.

The final examination of this plant was made on May 7th, 1906. There were two mould colonies present in the flask, and an abundant growth of *Ps. radicola* over the surface of the agar, this film was mucilaginous, drawing out in slimy threads when touched with the needle. A stain made with saturated alcoholic gentian violet showed that the cells were of characteristic appearance. No bacterial contamination was detected by staining, but spores and mycelium of the mould were seen.

The medium was still alkaline except near the roots, where the colour was largely reduced. The roots showed both general invasion and nodule formation, the nodules appearing above and below the swollen and infected parts of the roots. All the main roots were swollen and contained *Ps. radicola* in great numbers. A selected nodule showed numerous short and long rods, some swollen and clavate with banded protoplasm, and others with branching forms. Cultures were from the agar, from a nodule and from an infected root. The plate containing medium R82 inoculated from the surface growth in the flask developed only numerous and typical colonies of *Ps. radicola*. Stained preparations from these mucilaginous colonies showed the usual single polar flagellum.

Cultures from a nodule handled in a manner already described, in medium R102 produced numerous typical colonies of *Ps. radicola* between the fourth and tenth days. The colonies were mucilaginous and drew out in slimy thread and the cells were unflagellate. In plates containing medium R82 numerous colonies developed in two days, and sub-cultures in other media showed in all respects the characteristic growth of *Ps. radicola*.

The same process was carried out in detail with material from an infected root, and cultures and stain confirmed the presence of *Ps. radicola* in this root.

This method of flask culture, inoculation and isolation was carried out in detail with all our flasks, thus working out thoroughly the four cardinal requirements as set forth by Koch in his postulates.

Flask IX.—A control was planted September 12th, 1905, with one germinating pea seed. The plant grew until May 7th, 1906, when an examination was made. The medium was acid in the vicinity of the roots. The growth was moderate. The flask had not been inoculated and no nodules formed on the roots. There was no evidence at any time of any contamination in the flask. On May 7th, 1906, stains were made from agar in the flask, but these were negative. A piece of the living root was crushed on a slide and stained but no bacteria were seen.

On the same date plate cultures were made in ash-maltose-agar R102 and R82 from the agar in the flask and from the living roots, but these all remained negative after twenty-four days.

Flask VIII.—Was planted on December 12th, 1905, with one germinating pea and one germinating vetch seed. The flask contained 250 grams of medium R83. The loss by evaporation during the 159 days of growth was 22 grams, or .138 gram per day.

Inoculation.—The flask was then inoculated with a pure culture of *Ps. radiculicola* obtained from a vetch nodule on July 6th, 1905, and had been grown on medium R44 since July 12, 1905, a period of five months. In twenty-four hours at room temperature there was good growth of the organism on the agar and in the water of condensation.

Growth.—Both plants grew well, the vetch more vigorously than the pea. On January 17th, 1906, there were six nodules on the vetch and none on the pea. On March 23rd the largest nodule on the vetch was 6 mm. long and clove-shaped. As the roots of both vetch and pea penetrated the agar, the culture accompanied them and could be observed as a cylinder of growth around the roots. On May 10th the final examination was made. The vetch was thrifty and green, with two main stems, one 0.18 m. and the other 0.10 m. long, also other branches, so that the total length of stem was about 0.5 m. Photograph 40, Flask No. 3, was taken February 10th, 1906, at which date there were ten nodules on the vetch and none on the pea.

From the medium *Ps. radiculicola* was isolated in pure culture, subculture and staining methods furnished proof of the identity.

From the vetch three nodules were taken, the largest was 9 mm. long, forking at a distance of 6 mm. from the proximal end into two nearly equal branches, each about 2 mm. thick. The whole nodule was deep green with chlorophyll except at the growing ends, which were white. A section from the distal end showed a loose cortical layer and a central mass of bacteroidal tissue, brownish in colour, and mainly composed of bacteria. There were few simple rods, but many numerous and beautifully branched and twice branched cells. Cultures obtained from this nodule gave pure cultures of *Ps. radiculicola*, confirmed by subcultures and staining reactions (polar flagellum). Direct examination of the other nodules and cultures therefrom gave identical results. General infection of the roots had also taken place, pure cultures of *Ps. radiculicola* were obtained from them.

There were no nodules present on the pea. Four plates made from the interior of the pea root were all negative. The following media, R82, R87 and R103 were used and plates kept fourteen days.

Flask VII, containing 250 grams of medium RS2, was planted November 29th, 1905, with the germinating pea seeds. It was not inoculated, no bacteria were present and no nodules developed.

One mould colony developed by December 12th, 1905. This colony increased in size, and by May 4th, 1906, it covered, perhaps, one-fourth of the surface of the agar with a thin, zoned growth.

One of the peas formed no roots and died later, the other grew well, especially the roots. The energy of the plant seemed largely spent in root formation. The roots were long and slender and smooth without evident root hairs. The stem grew well, but after several months began to decline, so that, though growth continued, (the leaves and stems remained green), it did not increase in size. This excessive root formation and this decline in the growth of green parts were attributed to nitrogen starvation. These phenomena were reversed in the case of the inoculated plants, *i.e.*, the growth of stem and leaves was progressive without decline and was in excess of the growth of root.

Stains were made May 7th, 1906, from the surface of the agar and from the water of condensation in the bottom of the flask. Spores of a mould were numerous, but there were no bacteria. The stem of the plant that died had been invaded by the mould. Its juice was not turbid and on staining its tissue the mycelium of the fungus was found but no bacteria. The roots of the living plant were washed, crushed on a slide and stained, and no bacteria nor fungi were found in them.

Plate cultures in gelatin and ash-maltose-agar were made May 7th, 1906, from the agar in the flask and from the crushed roots of the living plant. Numerous colonies of a mould like *Penicillium glaucum* developed in all the plates, but no bacterial colonies. The plates were observed for twenty-four days. Photograph 40, No. 1, taken February 20th, 1906, illustrates this flask culture.

11. *Preparation and Distribution of Nitro-cultures.*—Preparation should be made in advance of the season. The medium can be made up early in the spring. It is a great convenience to have attached to the steam heating system a large sized autoclave, or a retort such as is used in canneries. A large sterilizer supplied with flowing steam is almost a necessity. Large enamel pails can be used for making up media, and a vacuum pump attached to the water pump is necessary for rapid filtration. If the bottles are new, it is sufficient to rinse them in cold water before filling. With a little experience one man can easily prepare the medium, fill and sterilize a gross and a half of bottles in a day.

Preparation of ash-maltose-agar for commercial cultures.—Add 10 parts by weight of wood ashes to 100 parts of cold tap water and stir

well, or add the ashes to the water when it is boiling hot and boil for a minute; filter within an hour through absorbent cotton by means of a vacuum pump. To fill 100 parts of the filtrate add 1 part of agar and 1 part of maltose, heat in steam, boil a minute over the flame and heat again in steam to dissolve the agar. Filter the hot solution through absorbent cotton by means of a vacuum pump. In filtering it is well to use a small plug of cotton thrust tight into the neck of the funnel, and to renew the plug each time after a litre or so has been filtered. When the medium is all filtered its reaction may be tested, using phenolphthalein as an indicator. The ash water may have been alkaline -9° to -12° , but the agar medium will be neutral or only faintly alkaline, not more than -1° . Siphon off the filtered medium into two-ounce French square, narrow-mouthed bottles of flint glass. Each bottle should receive about 35 c.c., which will nearly half fill it. Thrust a plug of cotton in the mouth of each bottle and sterilize in the autoclave at 10 pounds steam pressure for one-half to one hour, or in flowing steam for one hour on each of three successive days. Remove the bottles from the autoclave, incline them and allow the medium to solidify so as to present a large surface for inoculation. The medium will not usually be found favourable for growth when first made, but will be fit for use after two or three weeks and will improve with age.

Inoculation and Growth of Nitro-cultures in Bottles.—A mother culture for each species of legume is isolated the previous year or early the same spring, and from this several tubes or bottles of ash-maltose-agar are inoculated to be used from time to time for inoculating the bottles intended for distribution. These last may be inoculated by means of a sterile pipette containing the culture mixed with sterilized water, or it may be done by transferring a bit of the surface of the agar in the bottle by means of a platinum spatula. In two or four days at 25° C., the growth accumulates at the point of inoculation and gravitates down the inclined surface of the agar as a raised, transparent, wet-shining band which increases in width. The wedge of agar may now be shaken over so that the inoculated surface comes against the glass. By shaking back and forth a few times, all five faces become inoculated and in four to twelve days on favourable media there is a copious, wet-shining, mucilaginous or slimy growth over the whole surface of the agar and the culture may be used, or it may be kept for a month if desired, and there will be further increase in growth. Just before mailing a culture, the cotton plug is replaced by a cork which is well flamed before inserting. The printed label is attached, the bottle

is wrapped in a sheet of directions for using and packed with cotton in a wooden mailing case.

The materials required for 1,000 packages of nitro-culture are as follows:—

Agar, 3,500 grams	\$ 4 00
Maltose, 3,500 grams	10 00
Bottles, 1,000 at 2 cts. apiece.	20 00
Printed labels and directions, 1,000	3 00
Mailing cases, at 4 cts. each, 1,000	40 00
Postage stamps at 7 cts. per case, 1,000.	70 00
	<hr/>
	\$147 00

\$147.00 for 1,000 bottles, or about 14 $\frac{3}{4}$ cts. apiece, as each bottle contains enough culture for 60 pounds of seed, the actual cost per acre will be less than 4 cts. Making allowance for labour, steam, etc., these cultures should not cost more than 25 cents per acre, as compared with \$2.00 per acre charged by some commercial firms.

This method of preparing and using nitro-cultures offers several advantages. Each culture is, or may easily be, a pure culture and a living culture, for the growth in the agar is easily seen and is highly characteristic, so that failure to grow, or possible contaminations, are easily detected. There are at least two staining reactions, both easy of application, and so far as known, peculiar to *Pseudomonas radicola* (see staining methods). The burden and responsibility of preparing the media and growing the cultures is placed, not on the shoulders of the farmer, but rests with the bacteriologist, where it belongs. A competent worker can by these means isolate a pure culture of the nodule bacteria from a leguminous plant, grow it, prove that it is appropriate and efficient and distribute it alive and in pure culture at reasonable cost, and an intelligent farmer can apply the culture to his seed and observe whether or not the nodules form and whether or not the crop is benefited.

12. A number of cultures prepared in this manner were distributed throughout Canada in the spring of 1905. The results of this distribution were published in March, 1906, by the Ontario Department of Agriculture as Bulletin 148 —“Co-operative Experiment with Nodule-forming Bacteria,” and a short summary of these results are here given.

The samples were sent all over Canada, from Prince Edward Island to British Columbia, the number of cultures being as follows:—

Ontario	76	Assiniboia	13
Nova Scotia	66	Alberta	12
New Brunswick	11	British Columbia	15
P. E. Island	17	United States	2
Cape Breton	1		
Quebec	10	Total	246
Manitoba	23		

At the end of the season a circular letter was sent to all who had received cultures, asking what success each experimenter had had. These reports may be summarized thus:—

CROP	Total No. of reports received.	Inoculation successful, with increased growth of crop	Organisms already present in the soil.	No advantages from inoculation.
Lucerne of alfalfa.....	59	43	1	15
Red Clover.....	47	31	1	15
Peas.....	12	7	1	4
Beans.....	9	5	..	4
Alsike.....	2	1	..	1
White Clover.....	1	1	..	..
Vetch.....	3	2	..	1
Soy Bean.....	1	1	..	..
	134	91	3	40

In order to give an idea of these reports, a number of extracts are given from them which show the benefit some experimenters have obtained from the use of nitro-cultures.

Taylor Village, N.B.—I put three acres with the treated seed and three acres without the nitro-culture on a piece of heavy land, and in examining the plants from time to time I found that nodules were quite plentiful on the plants from the treated seed, and none on the plants from the untreated seed, and I also found the growth and thriftiness quite marked in favour of the plants from the nitro-treated seed. (Red Clover).

River John, N.S.—The plants from the treated seed were thicker and thriftier than those without the nitro-cultures, which were thin and spindly. The roots on the treated spot being loaded with nodules and very fibrous, while on the untreated there is far less root growth. (Red Clover).

Colwood, B.C.—The part treated with nitro-cultures looks green and more vigorous than the untreated. Nodules are numerous on the treated portion. (Red Clover).

Colina, B.C.—The clover plants were a lot better on the treated land. (Red Clover).

Emerson, Man.—On some plants treated the nodules were quite numerous. Those having nodules were very vigorous, but the others have made but small growth. (Red Clover).

Neepawa, Man.—The vigour of plants from seed treated with nitro-culture was very good. The untreated seed produced pale and short plants. (Red Clover).

Edmonton, Alta.—Numerous nodules on plants from treated seed and very healthy stand. With the untreated seed the plants were sickly with a few healthy stalks. (Red Clover).

Deep Rock, N.S.—Soon after seeding I commenced examining plants on the treated patch and found nodules present, which increased in size and number each week as the season advanced. There was a marked difference between the plants from untreated and treated seed in favour of the latter. (Red Clover).

Berwick, N.S.—The plants from treated seed were quite vigorous, those from untreated only half as high. (Red Clover).

Cypress River, Man.—Plants from treated seed very strong with numerous nodules, without nitro-culture much smaller and weaker. (Red Clover).

Naweg, N.B.—Very vigorous and numerous nodules from the treated seed; not nearly so vigorous without nitro-culture. (Beans).

Mount Salem, Ont.—The nodules on the beans not treated were small, about the size of pin heads, and pods on plants were short. On the plants treated the nodules were as large as small peas, growing tight against one another. The pods on the plants were longer and the plants withstood dry weather better than those not treated, being green and flourishing when the others were dried up. The beans when ripe were bright and even in the pods. I exhibited half a bushel of these at the East Elgin Fair and secured first prize on them. (Beans).

Lion's Head, Ont.—The alfalfa seed sown by me this spring, and treated with nitro-culture obtained from you, has grown without a check. That without the culture came up in patches, but did no

more. As the alfalfa has failed here before, I attribute my success to the culture.

Round Hill, N.S.—From treated seed the growth of plants was 25 inches, from seed untreated the growth about one inch. (Alfalfa).

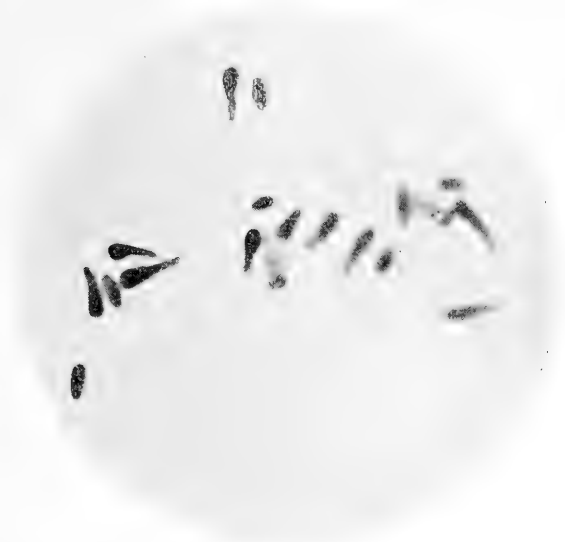
Mount Stewart, P.E.I.—Plants from treated seed were dark green and quite vigorous. From untreated seed the plants were yellow and unthrifty. (Alfalfa).

Colquitz, B.C.—I am not a believer in nitro-culture, or, at least, was very skeptical as to the treatment being of any value whatever. I have been unable, however, to shut my eyes to the fact as shown by my own land. The land had been well sub-soiled in preparation to a depth of from 16 to 18 inches, and the portion upon which the nitro-culture was not used was treated in every way as well as the other. The plants from the treated seed were very strong and sown with nurse crop are now about eight inches high. From untreated seed the plants are weak in appearance and only about three inches high. (Alfalfa).

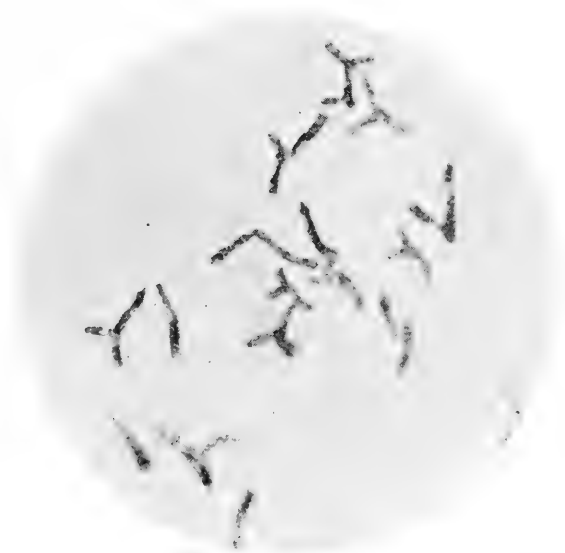
Cloverdale, B.C.—Plants from treated seed are healthy in colour and 18 inches high, from untreated seed four to six inches high and yellow. I may say, in conclusion, that the quarter acre of untreated seed was planted on better land, which had been under cultivation in root crops for two years, and had been slightly manured with barn yard manure and lime previously. The treated seed was planted on absolutely new forest land which is almost void of humus and available nitrogen. This speaks well for the cultures. (Alfalfa).

Charlottetown, P.E.I.—The boundary between the two plots is distinctly marked, that growing from the inoculated seed is a richer green and of stronger growth. (Alfalfa).

St. Catharines, Ont.—The culture was used on Alfalfa sown in April on fall wheat about fifteen pounds per acre. The stand at present is considered good, a difference being evident in favour of the nitro-culture treated seed. (Alfalfa).

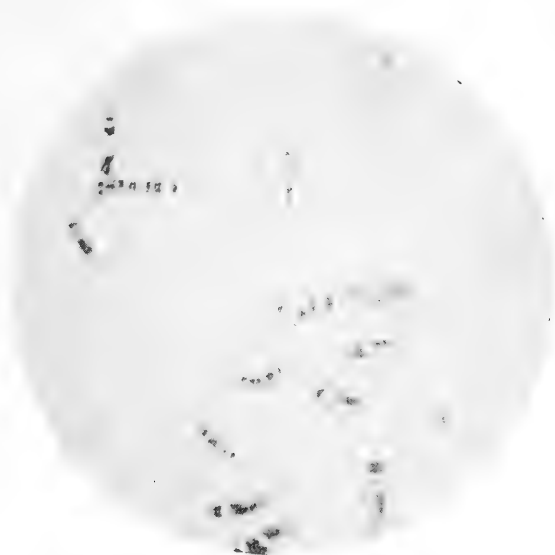


1. *Ps. radicicola*, from a nodule of *Trifolium repens* (Dutch clover), showing cuneate and clavate forms.



2. *Ps. radicicola*, from a nodule of *Melilotus alba*.
Sec. 1V., 1906. 14

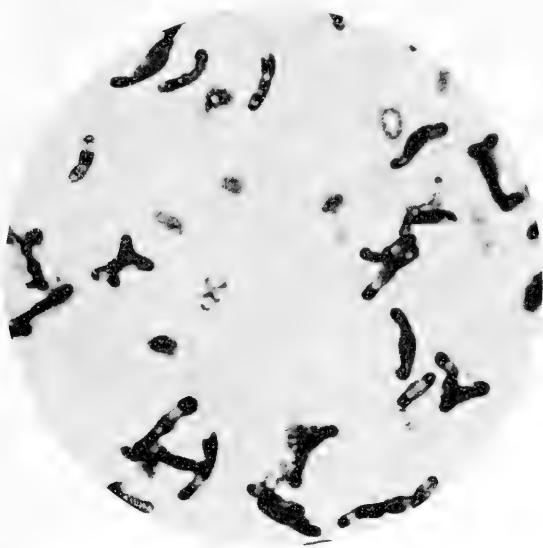




3. *Ps. radicicola*, from nodules of seedlings of *Medicago sativa*.



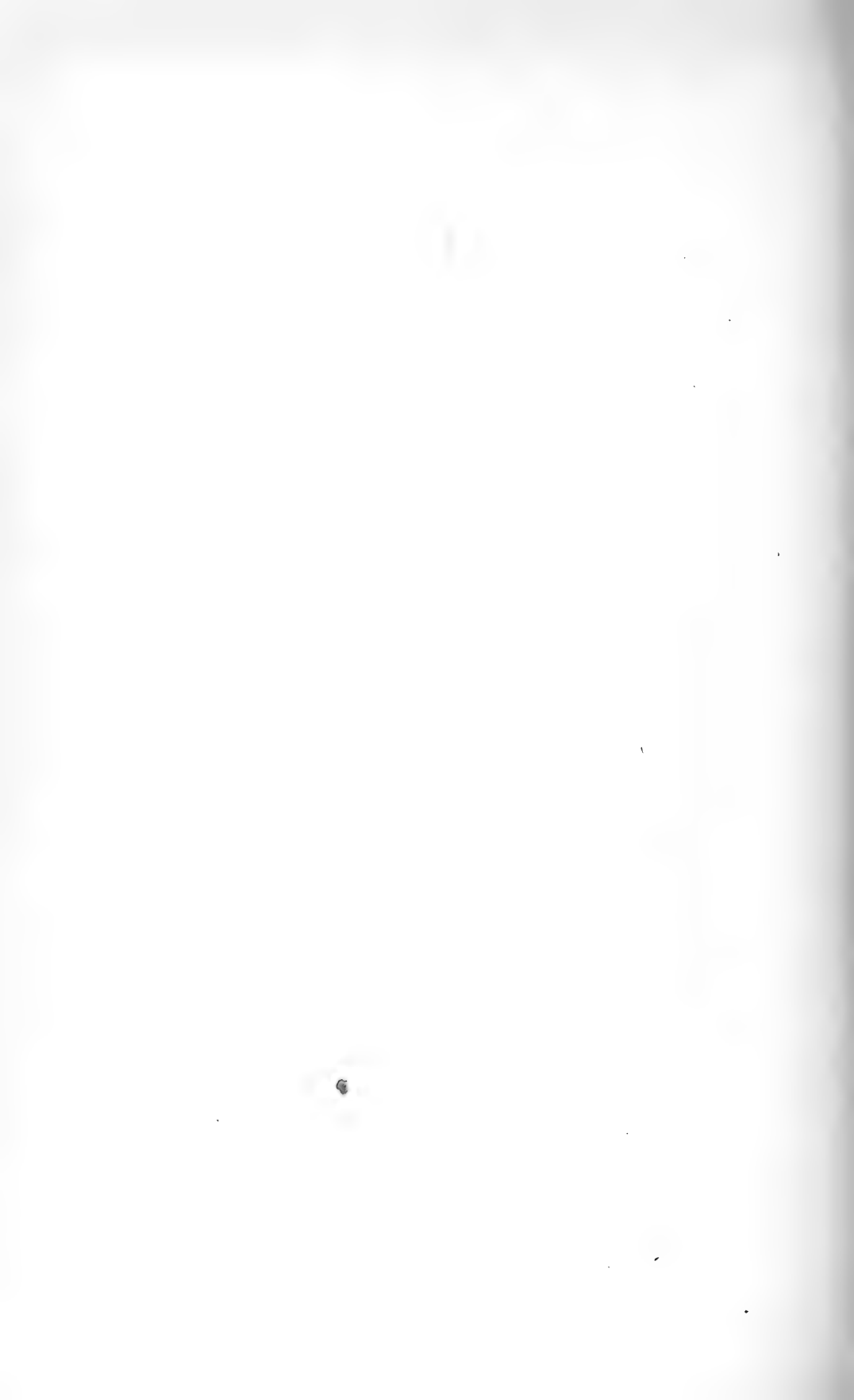
4. *Ps. radicicola*, from a nodule of *Medicago sativa*.



5. *Ps. radicicola*, from a nodule of *Medicago sativa*. The plant was grown in garden soil in a test-tube.

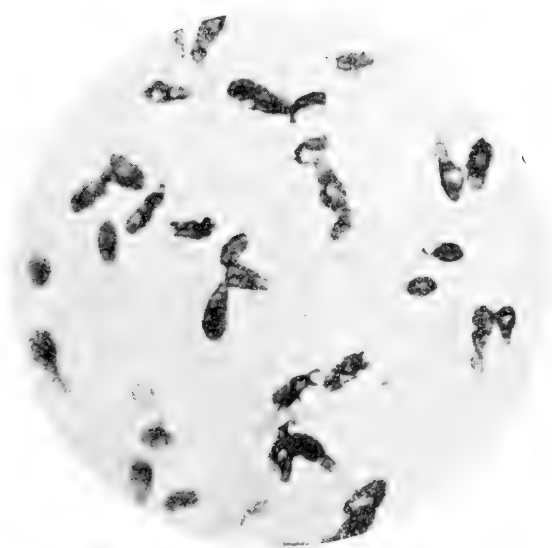


6. *Ps. radicicola*, from a culture on Medium R49. Age of culture 27 days.

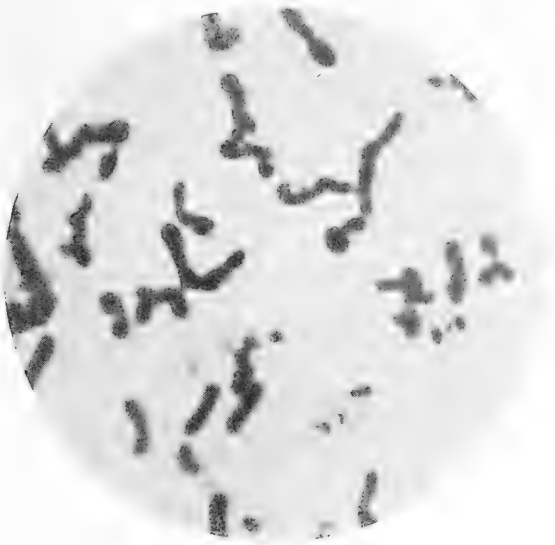




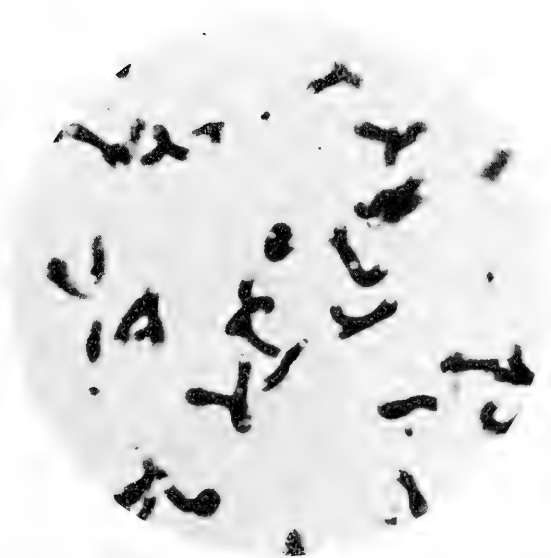
7. *Ps. radicicola*, from a nodule of *Medicago sativa* showing rods and branched forms.



8. *Ps. radicicola*, from a nodule of *Trifolium pratense*. Note irregular staining of protoplasm.



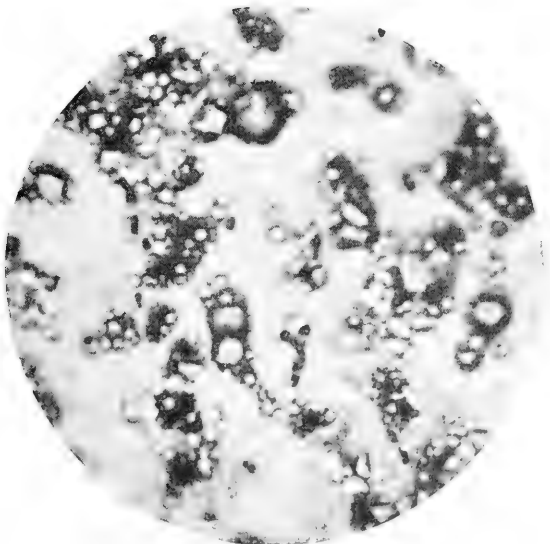
9. *Ps. radicola*, from a nodule of *Trifolium repens*. Large, irregular and branched cells, with banded protoplasm.



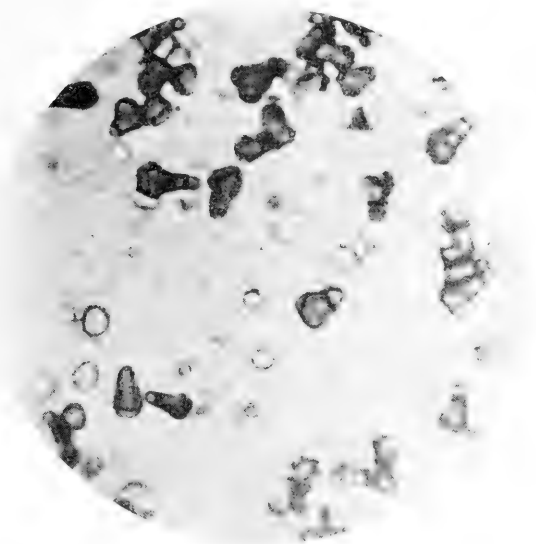
10. *Ps. radicola*, from a nodule of *Trifolium repens*.



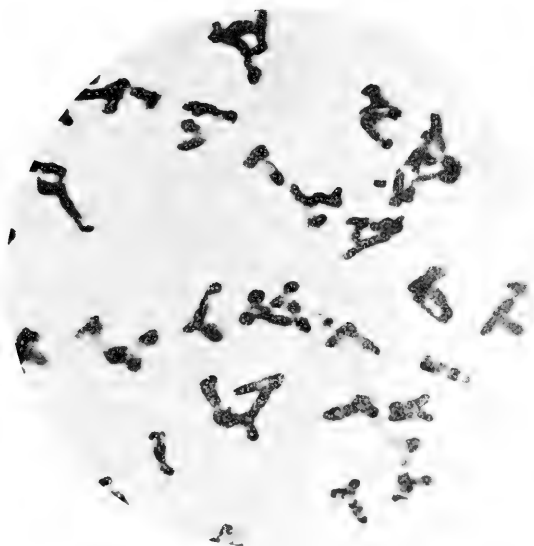
11. *Ps. radicicola*, from a nodule of *Lathyrus sativus*. Showing rodlike cells and no branched forms.



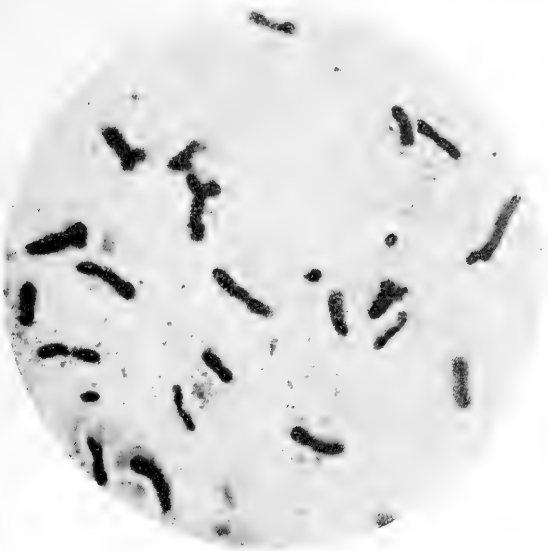
12. *Ps. radicicola*, from a nodule of *Pisum sativum*. Preparation shows relatively few bacterial cells, and these branched with banded protoplasm.



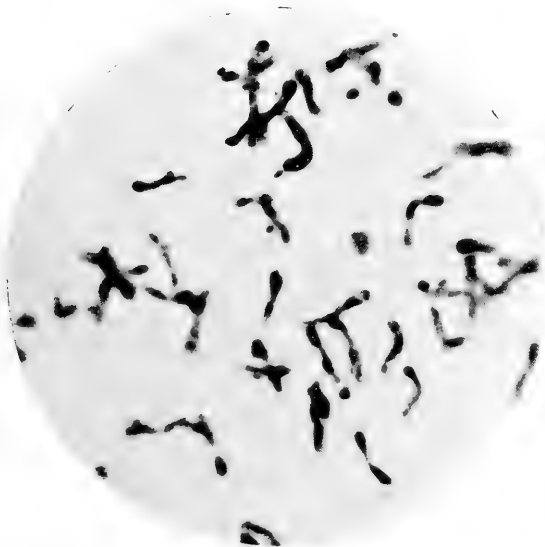
13. *Ps. radicicola*, from a nodule of *Vicia villosa*. The cells are short and broad, clavate and mallet shaped. Banded protoplasm.



14. *Ps. radicicola*, from a nodule (II) of *Lathyrus sativus*, showing branched forms.



15. *Ps. radiculicola*, from a nodule of *Trifolium repens*. Amyl Gram Stain.



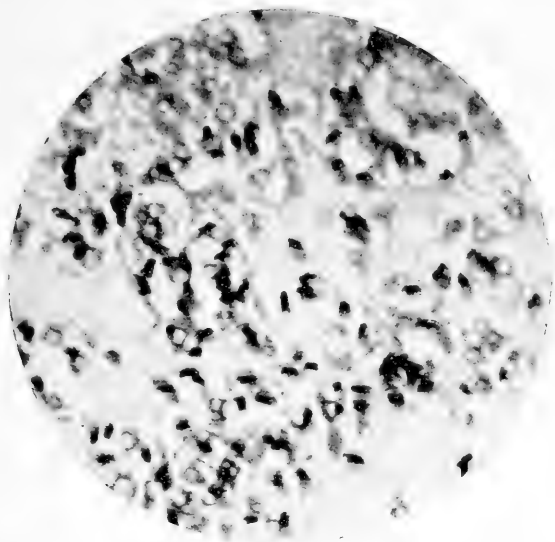
16. *Ps. radiculicola*, from a nodule of *Trifolium repens*. Amyl Gram stain.
Branched forms.



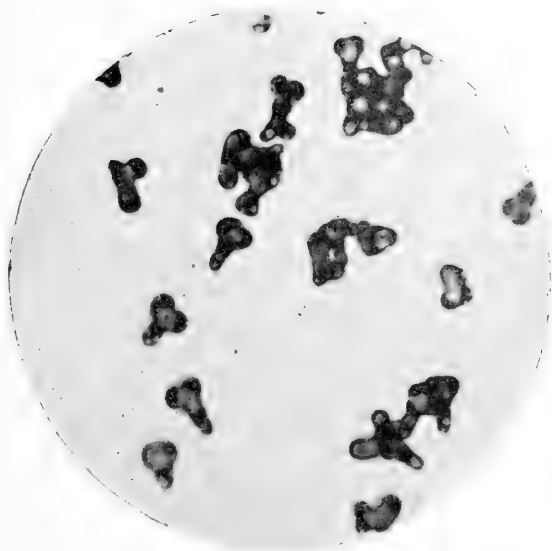
17. *Ps. radicicola*, from a nodule of *Phaseolus vulgaris*. Small rod-shaped cells.



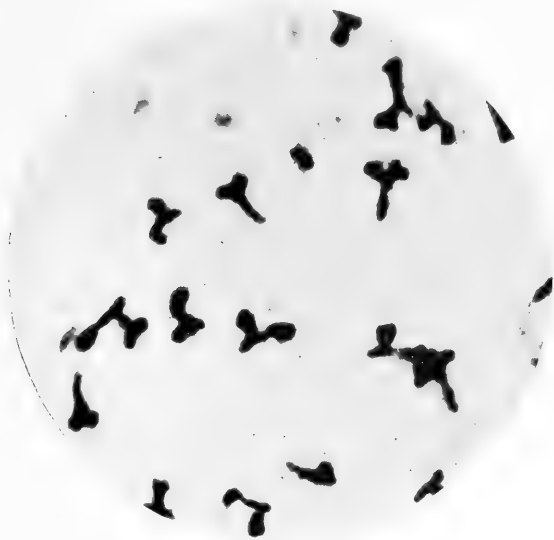
18. *Ps. radicicola*, from a nodule of *Vicia villosa*. Plant grown in flask I. Jan. 1, 1905, to May 31, 1905.



19. *Ps. radiculicola*, from a nodule of *Vicia villosa*. Plant grown in quartz, ashes and water in a flask.



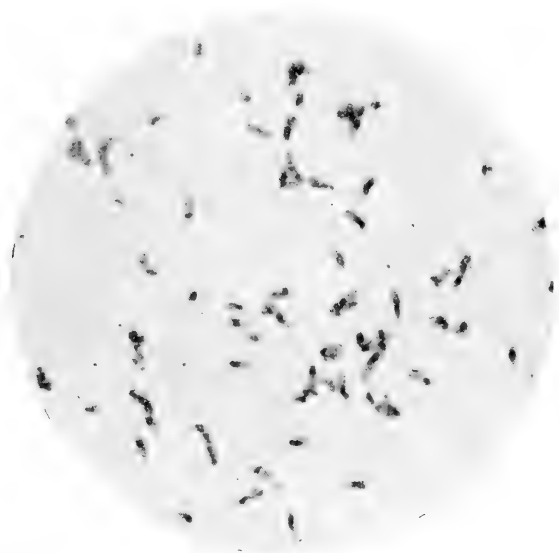
20. *Ps. radiculicola*, from a nodule of *Vicia villosa*.



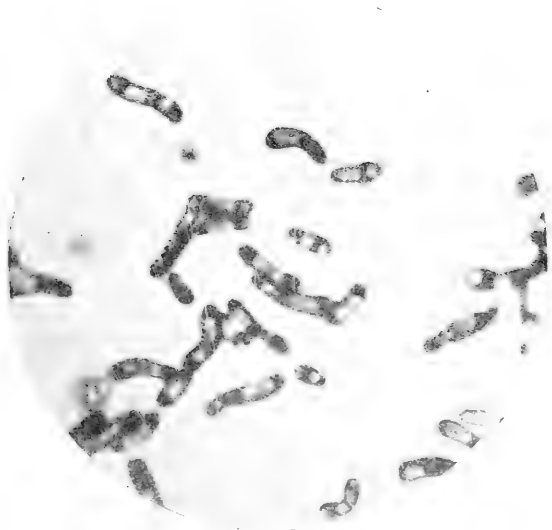
21. *Ps. radicicola*, from a nodule of *Vicia villosa*. Plant grown in ash-maltose-agar in a flask. Jan. 1, 1905, to May 10, 1905. From this nodule a pure culture was isolated.



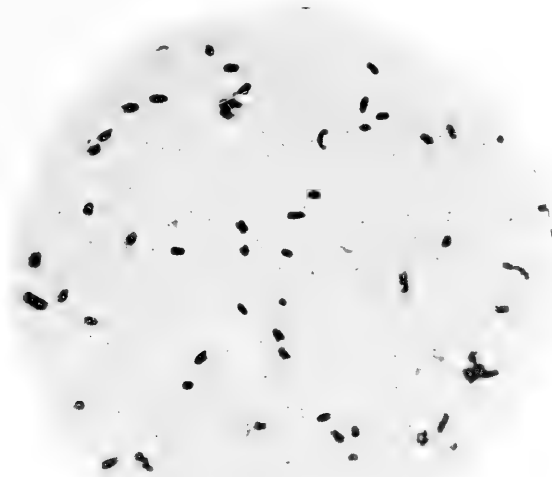
22. *Ps. radicicola*, from invaded root of *Vicia villosa*. Plant grown in flask I, Jan. 1, 1905, to May 31, 1905. The tap root was generally infected.



23. *Ps. radiculicola*, from a nodule of *Glycine hispida*. Medium Green Soy.



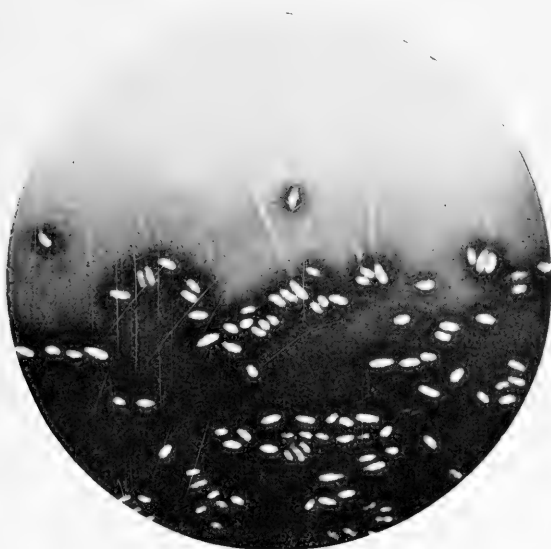
24. *Ps. radiculicola*, from a nodule of *Medicago sativa*.



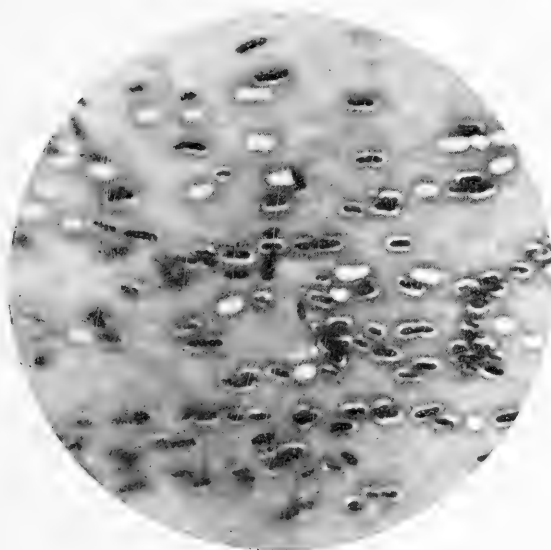
25. *Ps. radicicola*, from a nodule of *Vicia villosa*. Plant grown in ash-maltose-agar in a flask. Jan. 1, 1905 to May 31, 1905.



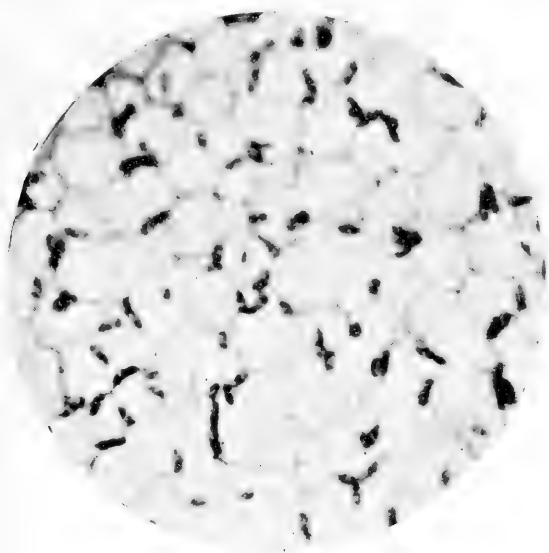
26. *Ps. radicicola*, from a liquid culture (R93) obtained from *Vicia villosa*. From the slimy sediment; shows branched forms. Amyl Gram stain. The corresponding agar stain showed flagella but no branched forms.



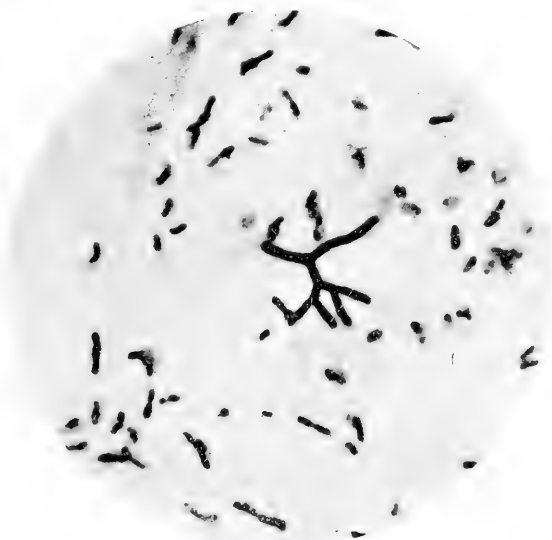
27. *Ps. radiculicola* from *Lathyrus sativus*. Culture on RS1. Age 17 days at 25°C. Stained with saturated alcoholic gentian violet. The mucilage of the culture takes the stain, the cells and their flagella do not.



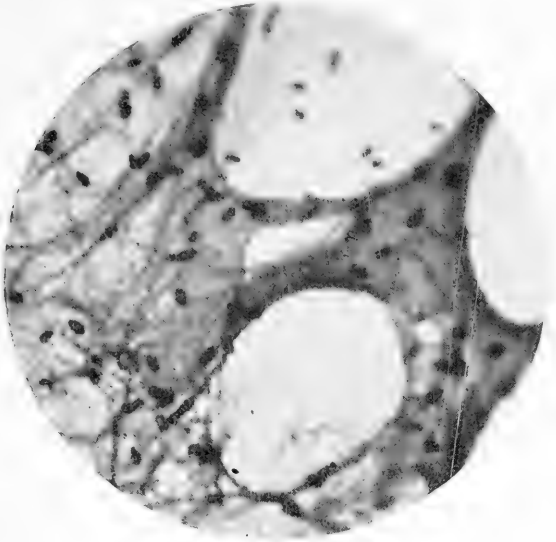
28. *Ps. radiculicola*, from *Phaseolus vulgaris*. Grown on ash-maltose-agar for 60 days at room temperature. Stained with Kütscher's gentian violet.



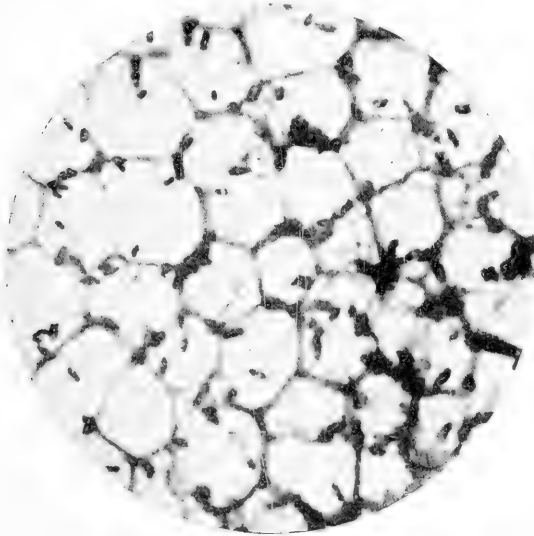
28¹ *Ps. radicicola*, same preparation as 28, but stained to show the slime threads Kütscher's gentian violet.



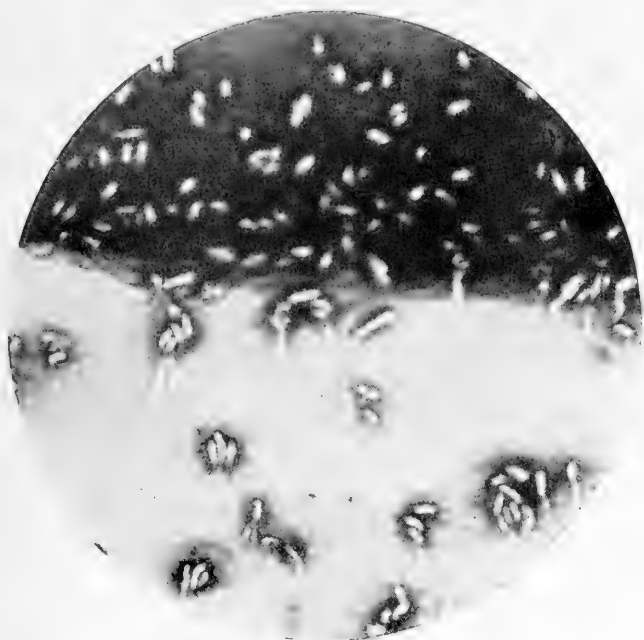
29. *Ps. radicicola* from *Trifolium pratense*. From sediment of an ash-maltose-water culture. Age 16 days at 25°C. Much branched cell, such cells are frequent in the sediment.



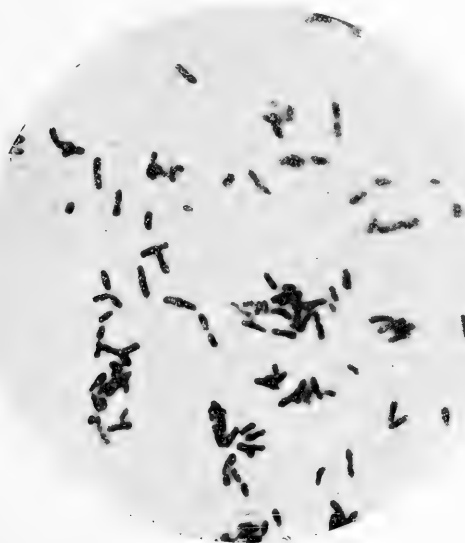
30. *Ps. radicicola*, from *Vicia villosa*. Isolated from a nodule July 6, 1904, by plating in medium R34. One colony transferred to medium R44 on July 11, 1904, and from this culture it was plated in medium R81, March 8, 1906, that is, after a lapse of 597 days at room temperature. Stained preparation was made from one of the colonies which developed after nine days growth. Kütischer's gentian violet stain for the slime threads.



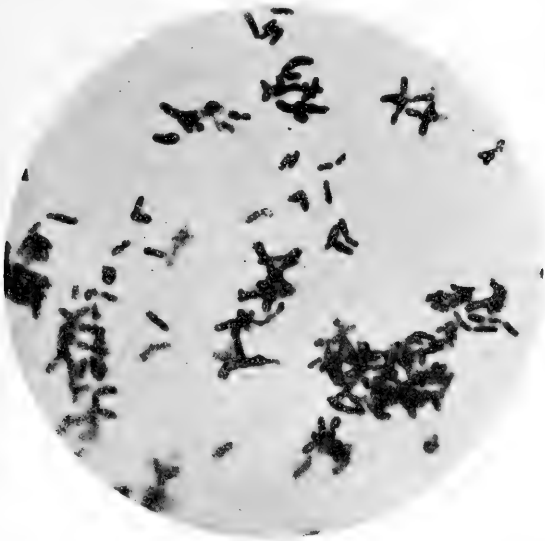
- 30.¹ *Ps. radicicola* from *Vicia villosa*. From another part of the same preparation as 30.



31. *Ps. radicicola*, showing flagella from *Vicia villosa*. From a culture on ash-maltose-agar grown at 25°C for 16 days. Stained with saturated alcoholic gentian violet.



32. *Ps. radicicola*, from *Lathyrus sativus*, from ash-maltose-water, 17 days at 25°C. Amyl Gram Stain. Unbranched cells.



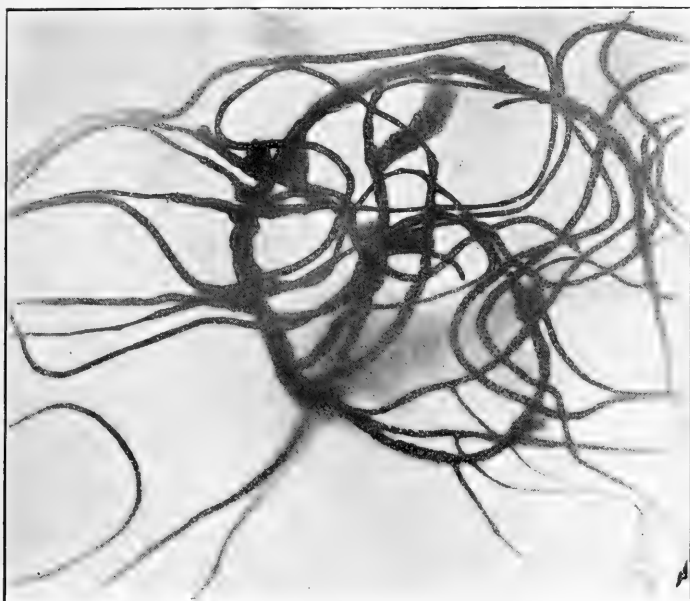
33. *Ps. radicicola*, from *Vicia villosa*. From ash-maltose-water, 24 days at room temperature. Preparation shows branched forms from slimy sediment. Amyl Gram stain.



34. *Ps. radicicola*, from *Lathyrus sativus*. From ash-maltose-water, 17 days at room temperature. The preparation was made from the ring of growth at the surface. The cells are mostly short rods as on agar, occasional much branched cells appear.



35. *Vicia villosa*. Plant I grown in ash-maltose-agar. The germinated seed free from bacteria was planted Jan. 1, 1905. The surface of the agar was inoculated Jan. 7, with a pure culture of *Ps. radicicola* from *Vicia villosa*. Growth vigorous for 4 months. Photo. April 27, 1905.



36. Photo of bottom of flask of plant I, *Vicia villosa*, showing club shaped nodules on the roots, (enlarged).



37. Photo of bottom of flask of plant I, *Vicia villosa*, showing moderate growth of roots, which are smooth except for the nodules. Largest nodules 8 x 2 mm after 4 months' growth.



38. *Vicia villosa*, plant 2. View showing the growth of roots. Not inoculated and no nodules formed. The roots did not grow smoothly like those of the inoculated plants, but became very nodose. As the growth of the stem and leaf gradually declined, the root formation became excessive. Photo after 4 months' growth.



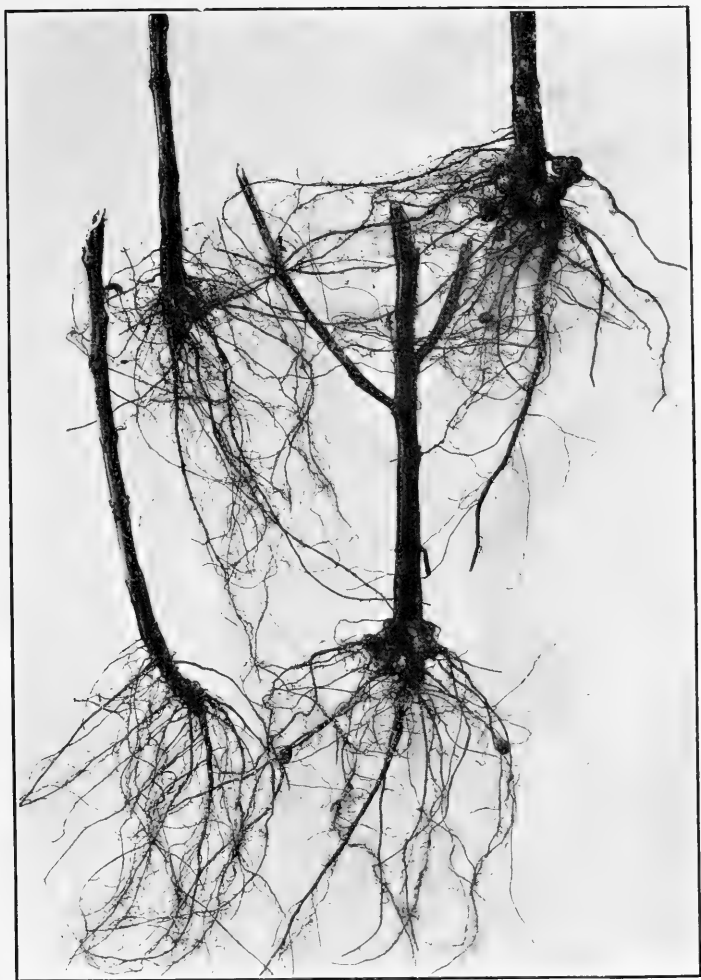
39. *Vicia villosa*, plant 2. Showing growth of stem and leaf, same plant as fig.
38. Photo after four months' growth.



40. Three flask cultures taken 10. II. 06. 1. Flask VII containing two pea seeds planted Nov. 29th, 1905. It was not inoculated. No bacteria were present and no nodules developed.
2. Flask X containing two pea seeds inoculated 12. IX. 05. The plant which lived had eight nodules, at the time the photograph was taken. May 7th it had 80.
3. Flask VIII planted on 12.12.05 with one germinating pea and one germinating vetch seed. Inoculated with *Ps. radicicola* obtained from vetch. 10 nodules developed on the vetch, none on the pea.



41. Soy Bean. Two plants grown in the open, the one on the right inoculated at the time of seeding with a culture of *Ps. radicicola* obtained from Soy, the one on the left untreated.



42. Soy Bean roots. Those on the right from inoculated plants, those on the left from untreated ones.



43. Photograph of colonies of *Ps. radicicola* obtained from *Lathyrus sativus*. This culture was made from a laboratory stock culture 1 year and 237 days old. The medium used was R87. Age of colonies 9 days.

XIII.—*A Birch Rope; An Account of a Remarkable Tumour Growing upon the white Birch.*

By D. P. PENHALLOW, D. Sc., MacDonald Professor of Botany, McGill University.

(Read May 22nd, 1906.)

While in attendance at the Forestry Convention held at Ottawa during the last winter, my attention was directed to a remarkable growth upon a white birch (*Betula populifolia*), which had been found in the New Brunswick woods and was subsequently deposited in the Museum of the Crown Lands Department. In response to an expression of opinion that the growth was of a nature which justified careful examination, I shortly afterward received from Mr. T. G. Loggie of the Crown Lands Department, a short portion of the growth which a very casual examination showed to be of an extraordinary character. The information accompanying the specimen was of the most meagre character, and it did not afford any clue as to the causes which might have issued in such an unusual development. The original, verbal information stated that the growth was at least twenty feet in length, and that it hung free, being attached at the upper end only. Upon communicating with Mr. Loggie with respect to further details, he forwarded the reply to Mr. H. M. Balkam of Plaster Rock, N.B., by whom the specimen was found, which contained only a repetition of what I had heard before. It therefore became evident that any further light which might be gained as to the cause of the growth, must be derived entirely from a microscopical examination of the specimen itself. This examination was therefore undertaken without any expectation of gaining a complete solution of the question, but of obtaining such information as would materially assist in explaining any similar growth should such be found at a future time; but the likelihood of a recurrence of any such growth in this latitude is exceedingly remote, as it seems to have resulted from a peculiar combination of circumstances which may not again appear.

Although the original specimen as found, is described as having been some twenty feet in length, the sample which reached me was only about 36 cm long; but this was quite sufficient to establish all the essential features of external appearance, as well as of internal structure. In its external aspects the growth may be described as follows:—

The surface is characterized by the presence of a white but very thin tissue which imparts the general aspect of birch bark. This layer is the

result of bleaching as developed in the outermost cork layers, the cells of which have also become devoid of contents, the whole as in the outer layers of normal birch bark. It is to be observed, however, that the bleached layers are not developed with uniformity over the entire surface and this, in conjunction with an irregular exfoliation, produces a blotched appearance due to the exposure of the underlying and brown layers. Further examination also shows no evidence whatever, of lenticels, nor are there any indications of nodal regions. It is thus to be noted that, while the general aspect of the structure is such as to indicate with certainty, its relation to the white birch, it differs from the latter in the important respect that there are no lenticels. The form of the growth is peculiar and points to some determining influence. The entire structure is of essentially uniform width and thickness throughout—that is, there is a variation in such dimensions of not more than about one millimetre. The cross-section shows a narrow ellipse, the dimensions of which are 1.0-1.1 cm. \times 0.30-0.40 cm., from which it is also to be observed that there is very little bulk, and that the growth was of an exceedingly slender character. A transverse section discloses the fact that the structure is not homogeneous, but that it is built up of a series of concentric layers disposed about a central, slit-like cavity. A magnifying power of ten diameters is quite sufficient to show that there are from 38 to 41 such layers, that they are composed of cork tissue and that they are separated from one another by a layer of absciss tissue which ruptures in drying, or which is completely ruptured by the action of the knife in sectioning; so that whether we look at the end of the specimen, or at the section removed therefrom, the layers are quite separate and distinct from each other (Fig. 1.)

Further, microscopical examination shows that the various cork layers have been disposed about a central region of parenchyma in which they obviously had their origin, and it is desirable that these regions should be studied in detail. The parenchymatous layer occupying the central area (fig. 2, pr.) readily splits at maturity as the result of extreme desiccation, so that it is never found entire, but its two halves lie on opposite sides of a central cavity and form layers of very unequal thickness as may be seen in the photograph. Structurally, it consists of rounded and very thick-walled parenchyma cells, between which there are also developed numerous and often very large intercellular spaces which probably represent a structural accommodation to internal aeration. The size and frequency of these spaces can be understood when it is recalled that in the absence of lenticels, respiration must have been carried on under exceptionally difficult conditions after the cork commenced to form, and towards the end of the growth it may even have become in-

tramolecular. Not infrequently the cells show a transverse elongation, indicating a branching habit of growth which is generally observed with greater clearness in the longitudinal section.

In the longitudinal section the parenchyma is seen to consist of usually much elongated cells which often become distinctly cylindrical and several times longer than broad (fig. 3, pr.¹ and fig. 4, pr.), but it is also equally clear that these cells constantly diminish in length toward the outer face until they gradually pass into cork (fig. 4, c). The walls are very irregularly thickened, and usually in such a manner that the

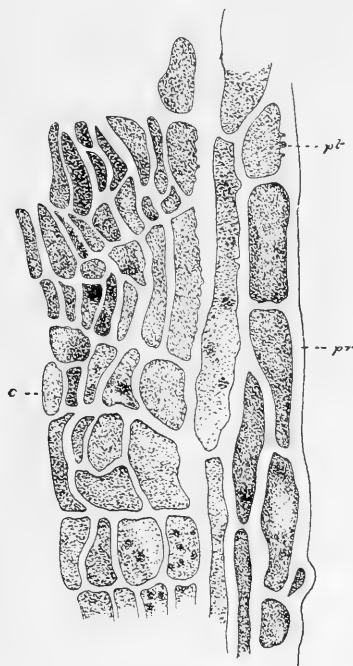


FIG 4. x 250.

relation of such thickening to mechanical support is quite obvious. The walls are also very generally provided with rather large and frequent pits which are nevertheless often so localized that a given section may not show them, but they appear in part, in figure 4, pt., as also in transverse section (fig. 5) where they impart a sieve-plate aspect to the terminal walls. Perhaps the most remarkable feature of the parenchyma tissue, is the presence of somewhat definitely organized medullary rays which, though localized, nevertheless show a very well defined relation to the other parts. In the transverse section (fig. 6, r.c.) they are seen

to be composed of radially elongated cells disposed in two or more series, but outwardly becoming abruptly shortened and passing into cork toward the outer face (fig. 6. o.f.) The tissue immediately abutting upon the rays is that of the general parenchyma structure, and the drawing (fig 6) gives one more example of the very irregular development it presents, as well as the extent and character of the intercellular spaces. In the longitudinal section, the rays are generally several cells high (fig. 3, mr.), and in all cases they are found to extend from the central cavity through the entire thickness of the parenchyma layer to the cork, with which their structure becomes blended.

On the outer face of the parenchyma tissue, there is a well defined layer of cork, the two being united into one structure throughout, with no evidence at any point, of an absciss layer. Nor is there any well defined evidence of a phellogen layer which evidently disappeared completely at the moment of full maturity. From this description it is obvious that the innermost layer of structure is composite, and that it consists on its inner face of the residue of parenchyma tissue of which



FIG 5. x 250.

the entire growth must have been composed in the first instance, while upon its outer face it consists of cork, the latter constituting approximately about one-third of the entire layer and representing the last product in the activity of the growing parts.

The cork presents, in the main, the features usually characteristic of such a tissue, deviating in detail with respect to (1) the somewhat unusual thickness of the cell walls, and (2) the presence of very abundant cell contents which persist throughout the entire structure (figs. 2 and 7) and do not disappear until the outermost layers have been brought under the influence of weathering and the bleaching process is developed. An inspection of the various layers of cork shows that each is composed of about six to eight cells with very great constancy. The various layers are separated by an absciss layer of one or rarely of two cells, the walls of which are very thin and easily ruptured, the cell itself being about twice the radial diameter of the adjacent and unmodified cork cells. The process of desiccation incident to full maturity, appears

to be sufficient to rupture this layer, so that upon sectioning, or even upon inspection of the original specimen, the layers appear quite distinct and separate from one another. A comparison of the layers throughout the entire transverse section shows considerable variation in thickness of such a nature that there is a more or less graduated diminution from within outwardly. Thus the outermost perfect layer of cork has a thickness of $17.8\ \mu$, while the innermost layer has a thickness of $53.4\ \mu$, giving a ratio of 1 : 3. From this it is evident that the various layers must have been subjected to compression in growth, and an attempt was therefore made to obtain a confirmation or denial of this result from another point of view. Accordingly measurements were taken of the radial diameter of the cork cells in the inner and outer regions of growth, as well as on the inner and outer faces of the individual layer in the two situations, with the following results:—

Innermost layer of cork united to parenchyma.	
Inner face	8.70 μ
Outer face	7.00 μ
Second or first completed layer of cork.	
Inner face	8.70 μ
Outer face	5.26 μ
One of the outermost layers of cork, immediately beneath the bleached layers.	
Inner face	3.51 μ
Outer face	3.51 μ

These results taken collectively, show most conclusively, that the layers of cork have been developed under considerable tension resulting from the resistance of the outermost and first formed layers. But the second set of measurements also shows very convincingly, what might have been anticipated on theoretical grounds, that while there is an augmenting tension toward the outermost layers, the same rule applies to the individual layer in such way that the outermost cells are always of inferior radial diameter. The general result is expressed in the measurements which show that the cells of the outermost layers are to those of the innermost layers, where the conditions were most favourable to free development, in the ratio of 1: 2.48, a fact which is also apparent from an inspection of figures 2 and 7.

Some interesting structural variations have been noted, and these may be briefly considered. Typically, the central region of parenchyma is surrounded, terminally as well as laterally, by well developed cork in successive layers. The parenchyma itself is somewhat more dense at the extremities where it does not readily admit of fracture at maturity

so that the internal space which is ultimately developed does not reach quite to the ends, but stops some distance short (fig. 1). This typical structure, however, does not seem to apply throughout, since a series of sections discloses local variations of a more or less marked character. Thus in figure 8 it will be seen that an area of parenchyma of circular form, has been cut off from the principal mass of structure and has formed cork all about it. Such nodal areas are sometimes duplicated by smaller ones (fig. 9), but whether there are one or two, the same development occurs at opposite ends of the same section. Another variation also appears locally, in the development of radiating zones of more dense structure (fig. 8). Whenever such zones appear, they lie between the nodal areas of parenchyma and the principal mass of tissue, and

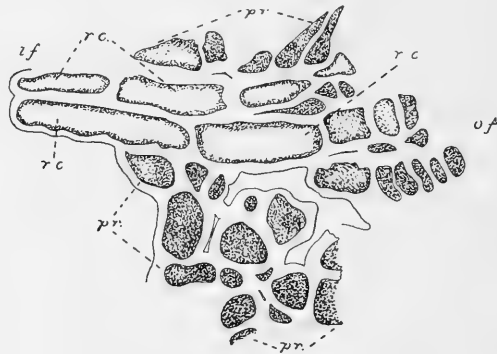


FIG 6. $\times 250$.

thence extending outwardly, they curve upward toward the narrower end of the section, at the same time broadening out in a fan-shaped manner. Upon a careful analysis of this region, it is found to be composed of a very compact and modified cork tissue which forms a perfectly continuous structure without absciss layers. The first suggestion arising from this observation is, that such regions are designed to furnish a necessary degree of cohesion between the various layers of cork which would otherwise become separated at an early period of development, whereby the integrity of the structure as a whole would be seriously jeopardized. Such indeed may be the case, but it does not serve to explain the origin of such localized variations in structure. Upon a closer scrutiny of the various parts, it will be observed that the following facts may be noted:—

1. The fan-shaped tissue has its greatest expansion in the outer layers of cork.

2. It does not extend to the outermost layers of cork which were the first in development, but it terminates several layers below the general surface of the structure (fig. 8.)

3. Where nodal areas of parenchyma tissue are developed, the outermost one is always the smaller or smallest as the case may be (fig. 9), the size increasing in centripetal order.

4. In the growth of the structure, the development of the cork has progressed centripetally and in such a way that the tension between the outer and inner regions steadily augments.

From the facts thus recited, it would be reasonable to conclude that the development of the fan-shaped areas of dense and modified cork, as well as the development of the nodal areas, is a direct response to conditions of tension attendant upon the formation of the inelastic cork membranes.

Conclusions.

Upon the basis of the foregoing facts, we are now in a position to consider an explanation of the peculiar growth under examination, so far as an explanation may be possible; but unfortunately we are not in possession of some of the most essential facts with respect to the special features which characterized the specimen *in situ*. In the absence of such facts, it is impossible to draw important inferences from its structure; and although we may not be able to ascertain the determining cause of such a peculiar development, we can determine certain aspects of its formation with accuracy, and from the conclusions so obtained, draw inferences which may prove of value as suggestions with reference to the possible solution of allied phenomena.

The question as to how and under what conditions the growth originated, is perhaps beyond the possibilities of successful solution at present, but in our efforts to reach an answer, it may be well to first of all examine into the bearing of the internal structure. As already pointed out, there is a complete absence of anything which can be interpreted as an evidence of intermittent, longitudinal growth, since there is an entire absence of nodes or of rings or scars which would mark successive periods of development, such as would be found in the leaf scars and nodes upon young branches of the same tree. From this circumstance we are led to infer that the entire growth in length must have been accomplished within the limits of one season. This conclusion is greatly strengthened by certain other observed facts. The structure as a whole is very slender, according in this respect with very rapid development. Furthermore, the absence of lenticels or other respiratory

and transpiratory organs, indicates that the development could not have been greatly prolonged, and that not only was the entire length completed within a short time, but that the formation of the cork tissue must likewise have been completed within a correspondingly brief interval. If we seek elsewhere, examples confirmatory of such development, it is very difficult indeed to find them in this latitude. It is true that in tropical latitudes numerous examples of rhizophores and aerial roots may be found, and these offer general parallels in development. But such aerial organs require for their growth, a humid atmosphere of relatively high temperature, and this rarely obtains—certainly not for any prolonged period—in a northern latitude such as that of New Brunswick; and even if, under exceptional circumstances such a combination were to occur in a moist woodland, it would still be difficult to consider it sufficient in itself, to induce the development of such a structure without the primary assistance of some special stimulus such as would arise through the presence of a definite lesion of some sort. For we are now dealing with an abnormal growth, and not with a normal development of lateral organs such as would be presented by aerial roots and rhizophores. And here we are faced with a mechanical difficulty of some importance. The bark of the white birch is enclosed in a definite periderm of considerable thickness composed of a large number of superimposed layers of cork. It would require considerable force to rupture such an investing membrane, and we should rather expect, as occurs usually in such cases, for the hypertrophy to respond to the pressure and give rise to a tumour of more or less spherical form, situated beneath the outer bark. But in this case the very remarkable form of the outgrowth itself may assist us to a correct interpretation of the facts. The “rope”—so-called because of its attenuated form, but without implying any torsion of its structure—has been found to present the form of a narrow ellipse in transverse section. This can have but one meaning with respect to the position which the rope occupied on the tree. It would be manifestly impossible for it to grow with its major axis in a vertical plane, for even if it emerged from the bark in that position, the effect of its own weight would soon develop a torsion which would speedily bring the major axis into a horizontal position, and this, we may assume, was its real position from the very outset of its development. Now it is to be observed that while the thickness of the rope may very readily have been the result of subsequent expansion, the breadth and more particularly the form, are in direct conformity with the length and the general shape of a lenticel which always occupies a horizontal position in the white birch. Such a lenticel would form a very natural point of emergence as a region of least resistance for a hy-

peritrophy originating immediately beneath it, and it seems to offer the most acceptable explanation of some of the most important features of the growth.

It is evident, however, that after emergence, the tumour must have continued its development in the form of parenchyma tissue until the completion of its length, and that this development must have been continuous within a short period as already shown. That there was a certain definite, though limited necessity for resistance to transverse strains such as would be developed by wind pressure, is evident from the presence of mechanical tissue in the form of the cylindrical, branching and thick-walled parenchyma cells; but that the necessity for such mechanical elements was not great, is also implied by its limited extent and by the complete absence of fibrous tissue.

The development of so attenuated an organ of such great length, necessitated some special provision for the transport of nutrient materials, as well as for the aeration of parts. This latter we have seen to have been provided for through the large and numerous intercellular spaces of the parenchyma tissue, and it is possible even, that the central cavity may have developed before complete maturity with special reference to this particular purpose. The longitudinal circulation of the nutrient fluids was provided for in the first instance, by the parenchyma cells themselves, but this provision no doubt proved inadequate after a time and it was therefore supplemented by the mechanical cells which also served as conductive cells, as indicated by their strongly developed and numerous pits. Lateral circulation was provided for in the same way and through the same elements, but more largely by the development of elementary medullary rays which served to connect the central region with the outer regions where the formation of cork was particularly active; and it is quite probable that these structures also served to some extent for lateral aeration.

We have yet to gain an explanation of the way in which the growth in length was accomplished. It may have been brought about in one of three ways, or by a combination of two or more of them.

1. The development may have been wholly basal and confined to the tissues lying within the area of the living bark of the parent tree. In that case the growth would have been pushed forward, and the increase of length would have depended entirely upon the formation of new tissue at the base. Had such a method of development obtained, the tumour would probably have shown more or less marked irregularity of surface indicative of want of absolutely continuous development, but nothing of the kind appears. Moreover, such basal development would have resulted in the cork being disposed in transverse layers, inasmuch

as the older parts would have matured as rapidly as formed; but on the contrary we find the cork layers to be developed longitudinally, and all the evidence points to a simultaneous activity throughout the entire length. We must therefore dismiss the theory of basal growth as being inconsistent with, and, indeed, opposed to the facts.

2. The second alternative is terminal growth. If the elongation were to depend entirely upon activity of the cells at the apex, then it would still be possible for all the more inferior parts to continue active until the close of the season, but two very substantial facts seem to be opposed to this view. In the first place, unless the rate of growth were far greater than we have any reason to suppose was the case, and indeed far greater than would be probable under the climatic conditions of the locality, the length attained would not have been completed within the limits of one season as there is good reason to suppose must have been the case. In the second place, under the influence of such terminal growth, the basal portions would have matured much in advance of the terminal parts, even while the latter were continuing to elongate. There is no direct evidence in the specimen to prove that such may have been the case, but on the contrary the strictly parenchymatous character of the basic structure seems to point to an opposite conclusion.

3. We are thus brought to our third alternative, according to which we may suppose that as the tumour emerged from the bark, it was composed wholly of very active parenchyma tissue which continued to increase in volume as such a tissue would naturally do when reacting to a traumatic stimulus. Under such circumstances, each cell would participate in the process of division, and thus through division and enlargement of the individual cells, the tumour would not only increase rapidly in volume, but at such a rate as would render its completion within a comparatively short time, a definite possibility. This would seem to my mind, the most satisfactory explanation which the observed facts will warrant. On this basis it becomes possible to account for the development of the cork which obviously proceeded centripetally, and nearly if not quite simultaneously throughout the entire length of the tumour.

The only other consideration that needs to be dealt with, is the structural alteration of the cork layers due to compression. It has been shown that each layer of cork was influenced by compression in such a way that the outer cells are always radially narrower than the innermost, an alteration also exhibited between the outermost and the innermost layers in such way that the cells of the latter are two and one-half times broader than the former. Otherwise this observation is supported by the fact that the innermost layers of cork are approximately three times thicker than the outer layers. But it is also probable that this

compression is expressed in the formation of the nodal areas of parenchyma, as well as in the local consolidation of the cork tissue accompanied by an obliteration of the absciss layers. Upon reviewing all the circumstances connected with this very remarkable tumour, we are brought to the following final conclusions:

1. The outgrowth had its origin in a lesion of the living bark, the precise nature and origin of which cannot be ascertained.
2. A definite hypertrophy developed as a traumatic reaction, but instead of becoming localized and forming wood or sclerotic tissue, it continued its development as active parenchyma and forced its way through the overlying and external tissue of the periderm.
3. The form of the outgrowth suggests that it emerged through a lenticel as a region of minimum resistance.
4. The probable relation of the outgrowth to a lenticel, suggests that it may have had its origin in the spongy parenchyma which forms the aeriferous tissue of the lenticel.
5. The outgrowth may be regarded as a special form of tumour, the particular character of which was determined by the nature of the surrounding parts, and particularly by the possibilities of ready exit through a lenticel.
6. The tumour developed by simultaneous division and enlargement of the component cells, throughout its entire length, and it was completed within the limits of one season of growth.
7. The formation of cork proceeded more or less simultaneously over the entire surface until final exhaustion of the parenchyma.
8. The primary cause of the tumour should be sought in a lesion of the living bark, combined with conditions of high temperature and high atmospheric humidity.

EXPLANATION OF PLATES.

- Figure 1.—Transverse section showing the general structure of the “rope,” and the development of the central cavity. $\times 9.5$.
- Figure 2.—Transverse section showing at *pr*, the parenchyma bordering upon the central cavity; *c*, the last formed and imperfect cork layer; *ab*, the absciss layer which has been ruptured. $\times 170$.
- Figure 3.—Longitudinal section showing at *pr*¹, the parenchyma cells of the innermost layer, which have assumed an elongated form and become mechanical cells; *pr*, the thick-walled cells of the same region; *c*, the last formed and imperfectly developed layer of cork; *ab*, the absciss layer; *mr*, the medullary ray. $\times 170$.
- Figure 4.—Longitudinal section showing at *pr*, the elongated parenchyma cells of the innermost structure bordering upon the central cavity, with pitted cells at *pt*, and on the left (*c*), the last development of cork tissue. $\times 250$.
- Figure 5.—Transverse section showing the pitted terminal walls of the parenchyma cells as in Fig. 4, *pt*. $\times 250$.
- Figure 6.—Transverse section from the region of the innermost parenchyma, with the outer face (*of*), the inner face (*if*), the parenchyma tissue with thick walls and intercellular spaces (*pr*), and a rudimentary medullary ray (*rc*). $\times 250$.
- Figure 7.—Transverse section showing the series of cork layers with absciss layers, and the variations in volume of the cork cells. $\times 170$.
- Figure 8.—Transverse section showing nodal regions of structure at the end of the central cavity, together with a radially developed region of modified cork devoid of absciss layers. $\times 34$.
- Figure 9.—Transverse section showing a nodal region at the precise extremity of the central cavity. $\times 34$.



FIG 1. x 9.5.

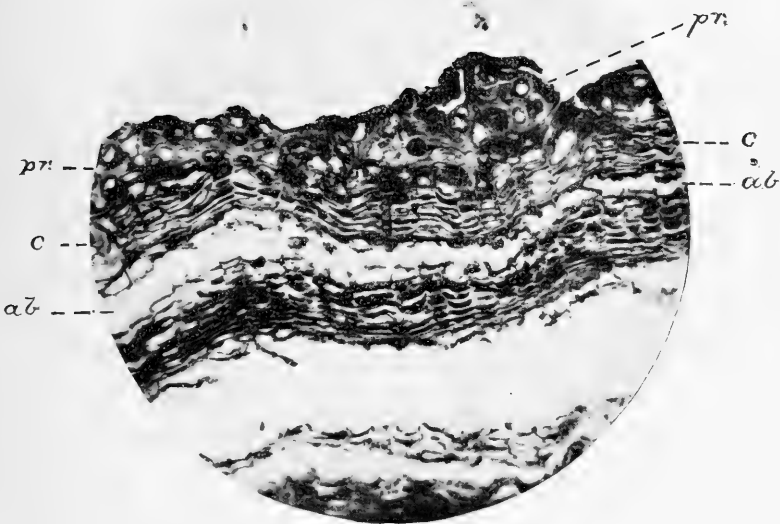


FIG 2. x 170.

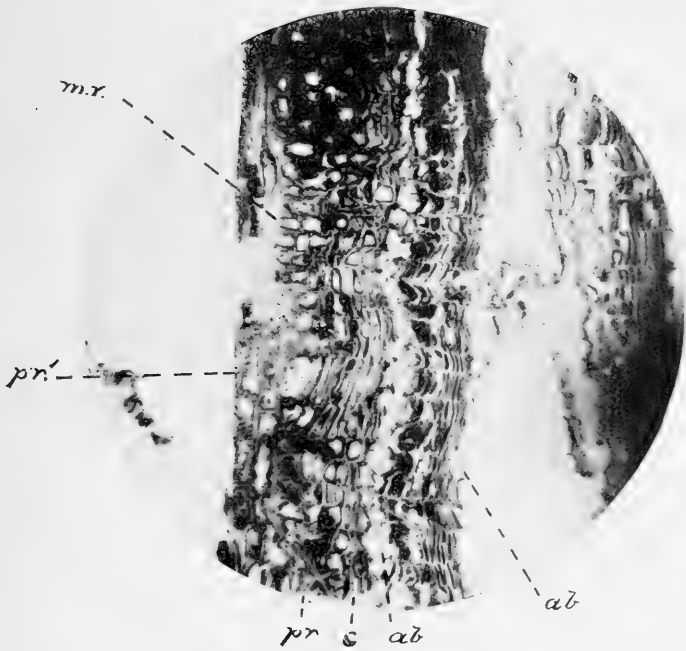


FIG 3. x 170.



FIG 7. x 170.



FIG 8. x 34.



FIG 9. x 34.

XIV.—*Some of the Unsolved Problems of Immunity.*

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Presented by PROF. WESLEY MILLS, M.D.

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Immunity is that property of living protoplasm which makes it insusceptible to the action of agents that are ordinarily deleterious to other organisms of a similar kind. From the point of view of the therapist it may be defined as "cure in operation from the beginning." Immunity, which is the special peculiarity of the organism from the earliest period of its existence, is termed *natural*, *innate*, or *hereditary* immunity. Immunity the result of causes influencing the organism during its lifetime is called *acquired* immunity. Strictly speaking, the word "immunity" denotes complete protection against external noxæ, but it is not customary to confine its application within such narrow limits. Complete or *absolute* immunity is rarely met with, but we have between this extreme and marked susceptibility all possible grades of *relative* immunity.

The phenomena of immunity are manifested in connection with a great variety of substances. These are in most cases chemical in nature and may be derived from the vegetable, mineral, and animal kingdoms.

A consideration of the subject of natural immunity gives rise to many interesting and suggestive lines of thought. It has long been recognized that certain organisms are more susceptible to the action of deleterious agencies than are others. These differences are evidenced with regard to species, races, families, individuals, and life-periods. As a general thing, we find that the cold-blooded species of animals are insusceptible in a considerable degree to the action of micro-organisms that produce disease in warm-blooded animals, and *vice-versa*. Noteworthy variations in this particular are also found in the case of the warm-blooded animals themselves. Human beings, for example, suffer from typhoid fever and syphilis, diseases that, so far as we know, never occur in the lower animals in the ordinary course of nature. Conversely, many of the infective organisms that attack the lower animals never

invade the human system. Again, the bacillus of anthrax is virulent for guinea-pigs and mice, but has no effect upon white rats. Ordinary sheep are also very susceptible to anthrax, but the Algerian breed are much more resistant. The field-mouse is susceptible to glanders, while the white mouse is immune. The microbe of rabbit septicæmia is excessively poisonous for rabbits but does not affect rats, guinea-pigs, or dogs. With regard to human beings different races exhibit similar notable differences. Whites, for example, are more susceptible to malaria and yellow fever than are negroes.

Family peculiarities have an important bearing on the etiology of infective disease, as hardly needs to be mentioned. That certain families are particularly liable to tuberculosis, and that when they have contracted it the affection goes badly with them, is a matter of common knowledge.

We may, moreover, narrow the matter down still farther, namely, to the individual. Personal idiosyncrasy is an element that always has to be taken into account by physicians. Some individuals are abnormally sensitive to the action of drugs, such as quinin, antipyrin, mercury, arsenic, salicylic acid, morphin, iodoform, and the venom of poison-ivy.

Age is also to be considered. It is a matter of common observation that children are much more susceptible to certain infective disease, such as measles, scarlatina, whooping-cough, chicken-pox, than are adults. On the other hand, children are believed to tolerate large doses of arsenic, belladonna, quinin, digitalis, potassium iodide, and mercury. Diseases like tuberculosis, typhoid fever, and osteomyelitis, are much more common in youth and early adult life than they are in those advanced in years.

When we come to seek the explanation of the occurrence of natural immunity we are confronted with many and great difficulties. The problem is most complex as most vital processes usually are. It would be idle, therefore, to expect a simple solution or even a single solution. The subject, too, is bound up inextricably with that most abstruse question — heredity.

By way of clearing the ground for a proper understanding of the matters we have to discuss, it is necessary to refer briefly to the means of protection which the animal organism naturally possesses. The ectodermic covering of the body is differentiated into two portions, the skin or epidermis and the mucous membranes. These constitute the first line of defence. Before systemic effects can be produced it is necessary for the offending agents to pass through the protecting envelope. This is ordinarily effected through the medium of an abrasion or other solution of continuity. When once an entrance has

been gained, the duties of protection devolve upon the blood and certain of the tissue cells and juices. The cells chiefly concerned in the combat against the aggressive agents are the polymorphonuclear leucocytes and hyaline cells of the blood, the lining endothelial cells of blood-vessels, lymph-spaces, and serous sacs, and to a less extent those of connective tissue. There is evidence, too, for thinking that the blood plasma contains substances that are inimical to the growth of infective micro-organisms. There is another factor, also, to be considered, namely, the lymphatic channels and the lymph-nodes. The lymphatic channels in the large majority of cases determine the line of invasion of the offending substances, and the nodes interpose a barrier in the shape of a filter, not merely a mechanical filter, but more than this, a vital filter, the cells of which have, to some extent, the power of fixing the deleterious agents and neutralizing their effects. From one point of view this is a decided gain, but from another, is harmful in that the presence of an extensive and intercommunicating lymph system renders the systemic dissemination of the offending substances more easy.

The bodily temperature appears also to be of moment. Many pathogenic germs can flourish only within a comparatively narrow temperature range. Outside of these limits their growth is inhibited or stopped altogether. This probably explains in part why it is that micro-organisms that are injurious to man are innocuous to the lower animals. In the coldblooded animals we have not only a low temperature, but in some cases a varying temperature, a condition of things that is highly inimical to many germs. In certain of the higher vertebrates the temperature is two or three degrees higher than it is in man. It would seem probable, also, though upon this point we have little or no information, that the plasma of human blood differs considerably from that of the lower animals in the matter of the contained salts and their relative proportions, and we have experimental evidence to show that a comparatively slight alteration in the percentage of the chemical substances contained in nutrient media is sufficient to materially inhibit the growth of bacteria. We may find in this an explanation of the variations in the susceptibility of various species of animals.

To give an adequate explanation of the variation in susceptibility in different races of the same species is extremely difficult. We know that many primitive races, living remote from civilization, such as the Eskimo, Icelanders, and North American Indians, are extremely susceptible to the ravages of infectious diseases like tuberculosis, small-pox and syphilis. The comparative immunity of other peoples is

probably due to the fact that for ages they have been attacked by these diseases and their tissues have in time become acclimatized, as it were, to the deleterious influences which are brought to bear upon them. In what this increasing resisting power essentially consists we are not in a position to say, but it is clearly inherited. The susceptibility of certain families to diseases like tuberculosis is probably also a hereditary peculiarity, the tendency being as it were, focussed in such persons as a result of certain accidents of marriage. No satisfactory explanation of personal idiosyncrasies has ever been offered.

We pass on now, however, to a more fruitful field for enquiry, namely, acquired immunity. It is a well known fact that individuals can acquire a toleration of poisonous substances by the ingestion of these substances in gradually increasing doses over prolonged periods of time. The chronic alcoholic, the morphinomaniac, and the arsenic-eaters of Styria are cases in point. Similarly, one attack of an infectious disease will in many cases confer a more or less lasting immunity. Small-pox, scarlatina, typhoid fever, and syphilis, rarely attack the same individual more than once, though exceptions to this rule undoubtedly occur. The degree of immunity in such cases varies greatly with the disease and the individual. The immunity after syphilis and small-pox is almost absolute, after other infectious diseases is less marked. Immunity of this kind, *active* immunity as it is called, can also be produced artificially.

Perhaps the earliest example of this of which we have authentic information is the inoculation for small-pox practised in the East and referred to by Lady Mary Wortley Montague in her letters written in the earlier part of the eighteenth century (1718). The method consisted in the inoculation under the skin of healthy individuals of material taken from the pocks. In this way a mild form of the disease was in many cases induced which protected against subsequent attacks. The procedure does not seem to have been at all certain in its results, however, and it was not until somewhat later, when Jenner introduced the practice of vaccination with the lymph taken from cases of cow-pox, that reliable results were attained. It is now believed that vaccinia or cow-pox is small-pox in an attenuated form, and that by giving a person an attack so mild as to be in most cases devoid of more than trifling inconvenience we protect against a much more serious type of the malady. In this case we are probably dealing with an animal parasite, but the same principle applies to certain vegetable parasites, namely, bacteria. It has been found possible to produce immunity by the inoculation of living bacteria whose virulence has been attenuated in various ways, as Pasteur did with chicken-cholera and anthrax in

sheep, or by the products of their growth, the bacteria having been filtered off or destroyed by heat, as in Haffkine's method of immunization against plague, and Wright's antithyphoid inoculations. Such methods, however, are in general more efficacious in preventing infectious disease than in curing it when once it has become established. A notable exception to this rule is met with in the case of diphtheria, in which disease we have in an antitoxic serum a powerful therapeutic agent. This, however, is prepared in another way. An animal, in this case a horse, is rendered immune by one or other of the methods mentioned, and when highly refractory is bled. The serum is separated from the blood and a certain amount of this when injected into a second individual suffering from diphtheria will often suffice to bring about cure, or, again, protect against the disease in those exposed to infection. This form of immunity has been termed by Ehrlich *passive immunity*. It is temporary in character and is brought about by the action of anti-bodies, elaborated in one individual, which neutralize the effects of bacteria which have gained an entrance into a second.

With regard to the method by which the economy protects itself against the onslaughts of the infecting micro-organisms many different opinions have been expressed. Klebs and Pasteur held that during the first attack of any given disease the germ used up all the available pabulum and that its existence came to an end, as it were by starvation. Until this food-stuff was recreated the person was immune. Chauveau was of the opinion that the toxic emanations from the bacteria kept on accumulating in the system until they reached such a degree of concentration that farther existence of the germ became impossible. It was, in other words, poisoned by its own excreta. Grawitz explained the production of immunity on the theory that infection is a combat between the germs and the cells of the body. If the cells are victorious in the conflict they acquire increased powers of resistance to the germ in question and subsequently are able to destroy it as soon as it gains an entrance into the tissues. These various ideas need only be mentioned, for they are not seriously entertained by pathologists at the present day. Two chief opposing schools of thought only may be said to be in existence now. Metschnikoff, the apostle of the doctrine of phagocytosis, would attribute the cure of infective disease and the production of immunity to the activities of special cells — phagocytes — especially certain leucocytes of the blood, the splenic corpuscles, the lining cells of blood- and lymph-channels and of serous sacs. The phenomena of phagocytosis are directly dependent upon the attraction (positive chemotaxis) existing between these cells and the bacteria and bacterial products. By their amœboid powers

the phagocytes take up into their substance bacteria, much as they would ordinary food-stuffs, digesting them, assimilating portions of their material, and rejecting others. In the opinion of this eminent investigator and his pupils, phagocytosis is the all important factor in the struggle of the body against infective disease. Opposed to this view is that of the "Humoralists." The work of Traube, Von Fodor, Pfeiffer, and Nuttall, to mention only a few, goes to show that certain protective substances are contained in the serum and plasma of the blood, which have the power of destroying defective micro-organisms. From this point of view, the struggle against infection may be regarded as a sort of scavenging process, the phagocytes taking up and digesting micro-organisms that have been destroyed by other means. Flugge has graphically illustrated this conception by comparing the phagocytes to the trenches made ready behind the fighting line to receive the conquered dead.

It might at first sight be thought that these views are incompatible, but a little reflection will show that this is by no means so. It is conceivable that the bacterial substances in the plasma or serum are derived from certain cells, and that, therefore, the cells are the important factor after all. More searching enquiry would seem to bear this out. Long ago, Hankin proved that the leucocytes of immune animals contain bactericidal substances, and the more recent researches of Buchner, Vaughan, Denys and Havel, and Ribbert, go to prove that the bactericidal power of blood serum is due to substances derived from the leucocytes. As the matter now stands it may be said that practically all pathologists admit the great importance of phagocytosis in the reaction of the organism against infective disease. Metschnikoff on his part has been constrained to modify the original position and now accepts the view that there is an extracellular as well as an intracellular activity brought into play. The points in debate at the present time appear to be the relative importance of the intra- and extra-cellular activity as well as certain questions in regard to the details of the process by which immunity is brought about.

The process of immunity has been aptly compared to a conflict, the micro-organisms damaging the tissues by means of the toxic products of their metabolism, the invaded organism in its turn endeavouring to protect itself against the microbe by the elaboration of a certain defensive mechanism. When we consider the vital processes of the invader and the invaded we can readily understand that the phenomena of infection and the reaction against infection must be highly complicated. From all we know of metabolism in general we may infer with considerable probability that the mechanism of defence consists in the

production of protective substances which, entering the blood stream, are carried to the remotest parts of the body. These substances can be demonstrated in the blood and are undoubtedly the result of some vital process on the part of the infected organism, though where they are formed has not as yet been determined with certainty. Farther, it seems to be generally agreed that Ehrlich's view is correct, namely, that before bacterial intoxication can occur, the toxin in question must enter into a chemical combination with some cellular element of the body. It is important to note in this connection that these chemical affinities vary considerably, certain toxins having a special predilection for attacking certain cells, while others escape. Thus, the tetanus toxin and that of rabies have a marked tendency to attack the central nervous system; the diphtheria toxin has an attraction for the peripheral nerves; the toxin of scarlatina is prone to damage the secreting cells of the kidney, and so on.

To emphasize this peculiarity that the toxin has of turning to a particular class of cell, Wright has coined the term "tropine" to designate bodies of this kind. Adopting this terminology, we may call the protective substances elaborated to combat the deleterious agents "antitropines." Several kinds of antitropines have been discovered, some capable of neutralizing the effects of bacterial tropines, others the tropines of certain highly organized plants, still others, those of animal origin, such as snake-venom. After twenty years of research we are only now beginning to apprehend the importance of these antitropines and the marvellous complexity of the protective forces of the body. Several kinds of bacterial antitropines have already been demonstrated, such as antitoxins, agglutinins, precipitins, lysins, and opsonins, and there may be others. Moreover, these differ both quantitatively and qualitatively in special cases.

The work of Wright and Douglas, published during the past two or three years, has thrown a flood of light upon the abstruse subject of immunity production. These observers have shown conclusively that the blood-fluids play a most important role in connection with phagocytosis. By investigating the action of the serum and the leucocytes separately and in conjunction upon bacteria, they have demonstrated that substances exist in the serum which, in some way later, the microbes in such a way as to render them an easy prey for the leucocytes. These substances they call "opsonins," from the word "opsono," "I cater for," "provide victuals for." Divesting their method of sundry technical details, it may be summed up as follows: Certain volumes of serum, bacterial emulsion, and leucocytes, previously washed in a half per cent solution of sodium citrate in normal

salt solution are mixed together, placed in the incubator for fifteen minutes at 37° Cent. A film is made from this on a glass slide, stained by a modified Romanoffsky method, and the number of bacteria ingested by the leucocytes is determined. The bacteria contained within twenty cells are counted and an average struck per cell. The authors find that the leucocytes have no power to engulf bacteria unless the latter have previously been sensitized by contact with blood serum. Conversely, serum loses its sensitizing power if it be heated to 60° to 65° for fifteen minutes. Clearly, then, the serum contains some substance of fundamental importance in determining the fact of phagocytosis. These opsonins, as they are called, are thermolabile, and, according to Wright and Douglas, act by effecting some change in the bacteria and not by directly stimulating the activities of the leucocytes. These observations have been amply confirmed by later observers, notably, Bulloch and Atkin, Hektoen and Ruediger, and Dean. In the case of the sera of animals immunized against certain infections, it has farther been shown that opsonins are present in the blood in increased amounts, and, moreover, as a result of the inoculation of bacterial toxins the opsonic content of the blood can be increased. Some doubt still exists as to the nature of these opsonins of Wright and Douglas. Dean, for instance, holds that opsonins are thermostable and, therefore, are to be identified with the specific "immune body," "fixateur," or "substance sensibilisatrice," previously described by other observers, as Denys, Metschnikoff, Savtschenko, and Levaditi. The question arises whether the opsonins of normal blood serum are identical with those of immune sera. Dean's work would tend to confirm the idea that they are. That normal sera contain an immune substance has, of course, been known for some time. The normal antitoxin (*e.g.*, of diphtheria) and antiferments need only be mentioned. The observations of Pfeiffer, Bordet, Moxter, Ehrlich, and Morgenroth, have firmly established the fact that the bacteriolytic and haemolytic actions of normal sera are due to the presence in the sera of an immune body plus a complement. With regard to opsonins, it is still undetermined whether free complement may take part in the preparation of the microbes, but Dean's work goes to show that this at all events is not a necessary factor in the case.

It would be interesting to know, as tending to elucidate the question where the opsonins originate, if there be any relationship between the increased number of leucocytes so often found in the blood in most infectious diseases and the amount of opsonin in the blood. Our knowledge at present is not sufficient to give a decided answer to this important question. The experiments of Bulloch and Ledingham with

regard to this point have failed to show any constant relationship between the two factors. With certain drugs, such as sodium cinnamylcum and tallianine, which produce marked leucocytosis, no increase in opsonin could be made out. With the nuclein of yeast, however, they observed a notable increase in the opsonic content, often unassociated with any increase in the leucocytes. Huggard and Morland, on the other hand, found that the internal administration of yeast led to an increased output of opsonins as well as a marked leucocytosis. This is an interesting scientific explanation of the efficacy of a certain empirical line of treatment of infection in vogue in certain countries, notably, France, namely, the treatment of furunculosis with brewer's yeast.

The doctrine of "opsonins" gives us a working basis on which to explain some at least of the phenomena of infection. When bacteria gain an entrance into the economy some of them are immediately sensitized by the plasma and are thereupon engulfed by the phagocytes. The amount of the immune substance available is, however, small and the supply soon exhausted. Consequently, if more micro-organisms be present than it is able to deal with, they will multiply and be either indifferent to the phagocytes or exercise a repelling influence upon them (negative chemotaxis), there being no free immune bodies present.

The activity of the opsonins is, however, but one phase of the reaction against infection. As before mentioned, there are several other substances in blood serum which exert defensive powers. In the case of cholera and typhoid fever, Pfeiffer showed that the specific germs of these diseases when subjected to the action of immune serum were first agglutinated rendered motionless (Pfeiffer's phenomenon) and eventually dissolved (bacteriolysis). Such immune sera, therefore, contain two substances, agglutinins, which clump the bacteria, and lysins, which dissolve them. It used to be thought that the phenomenon of agglutination was a necessary part of bacteriolysis, but this is not the case. A serum that is both agglutinative and bacteriolytic may be deprived of the latter property without detriment to the former. Lysins are, therefore, different from agglutinins. It is rather singular, perhaps, that lysins cannot be always demonstrated to be present in cases of infectious disease. This, however, simply indicates the great complexity of Nature's processes and proves that the same end may be achieved in a variety of ways. In this sphere, also, apparently, more than one road leads to Rome. Similarly, antitoxins, which are so potent a factor in the case of certain infections, as, for example, diphtheria, cannot always be detected. Why these marked differences in different cases we are at a loss to know. It would seem as if there

were a variety of protective mechanisms potentially present, any one or more of which may on occasion be called into play. That these mechanisms are not altogether specific is shown by the fact that to some extent they can be manifested by normal tissues and body fluids and seem to be a fundamental property of cell-protoplasm. While it is true that certain of them can be increased in potency by the injection of bacterial toxins and then probably become specific, yet these protective substances can be elaborated in other ways. The curative action of the ferment of yeast or *saccharomyces* in cases of infection with a germ of a different class, the *staphylococcus*, is a case in point. Some other interesting facts may also be referred to in this connection. More than forty years ago a distinguished member and former president of this Royal Society, Sir James Grant, M.D., made a striking series of observations on the action of the lymph of cow-pox (vaccine) in the case of certain skin diseases (*London Medical Times and Gazette*, March 14th, 1863). Affections, such as psoriasis palmoris, tinea nummularis, psoriasis lapræformis, and even syphilis, which had resisted for years the ordinary measures, yielded in a comparatively short time to the action of vaccination of the Jennerian type. We are not sure, of course, of the etiological factors at work in the diseases mentioned, but, if not microbic, they are at least due to blood dyscrasiæ and the products of the metabolism of the organism of cow-pox, whatever it may be, affected some alteration in the system which resulted in cure. Again, occasional instances are met with where the toxin of one germ is antagonistic to the growth of another. At least, this can be shown *in vitro*. The products of growth of certain bacteria, such as the *B. Prodigiosus* and the micrococcus of erysipelas, have been found to be detrimental to cell growth and metabolism, as witness the beneficial effect that Coley's method of treatment has in some cases of malignant disease. Facts such as these still want explanation, but farther study along these lines may eventually result in the discovery of laws which will be valuable in the therapeutics of infectious disease. All, however, goes to show that the laws governing immunity are of the widest scope, and that the process is probably in the main to be explained on chemical principles, though the vital properties of the cells and tissues are by no means to be neglected.

XV.—*Notes on the Mineral Fuel Supply of Canada.*¹

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(Read May 23, 1906.)

In a country of such enormous proportions as the Dominion of Canada, extending from east to west across the thousands of miles between the Atlantic and Pacific oceans, and northwards into the ice-laden waters of the Arctic, with its months of severely cold but bracing climate, the question of an adequate fuel supply, as a source of heat, light and power, must always be of paramount importance. To some extent the requisite of power is now being provided by the utilization of the numerous waterfalls with which Canada is so well supplied, whereby practically an unlimited amount of energy can be produced and distributed by electric cables to long distances. This electric power will before many years be utilized on our present great railway systems with their thousands of miles of transcontinental trunk-lines and their radiating net-work of branches, as well as for the motive power of many of the large manufacturing centres; but it is scarcely probable that our ordinary fuel supplies will be entirely superseded in all kinds of transport or general industry, while the grand problem of fuel for household purposes alone presents an interesting feature which must be of much general interest.

Some thirty or forty years ago it was the generally accepted opinion that in the matter of coal supply Canada was to a large extent deficient. The areas in Nova Scotia, more especially those in Pictou county and on the Island of Cape Breton, had long been known, and had been worked to some extent for more than a century. In New Brunswick also coal had been mined from the small seams of the interior for many years, though the annual output never exceeded a few thousand tons; but west of that province it was supposed that coal, as a source of fuel supply, was almost entirely lacking. The great deposits of British Columbia were scarcely known, with the exception of the coal basin of Vancouver Island; and our knowledge of the fertile plains of the Saskatchewan district, with their enormous deposits of lignite, was practically confined to the information contained in the reports of the Palliser and Hind expeditions which nearly fifty years ago traversed a comparatively small portion of the plains country. With the further exception of a few who, in the interests of science, and often in the face of great difficulties as

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regards transport, or of danger from Indians with whom no treaties had then been made, endeavoured to ascertain in some small way the economic resources of our western heritage, very little enterprise had been shewn in this direction. With the advent of Confederation and the acquisition of the great area lying east of the Rocky mountains a new state of things was inaugurated, and parties of exploration were sent east and west and to the farthest north. With the growth of knowledge arising from the detailed examination of every portion of the Dominion, carried on largely by the officers of the Geological Survey and by the Topographical Branch of the Interior Department, we have now ascertained this fact, that in every province of the Dominion, from Nova Scotia on the east to the most northern confines of British Columbia on the west, including the islands of the Pacific adjacent to the mainland, and extending into the wilds of the Yukon district, coal or mineral fuel in some form and in workable quantity is to be had whenever its exploitation for commercial purposes is required. Even in the Arctic islands and on the adjacent coast of Greenland large deposits of coal are now known to occur; and although no commercial value can at present be attached to the northern deposits on Canadian territory, it may well be supposed that, in the rapid development of our great country, the time may come when even these stores of fuel will be found available for economic purposes.

It is readily seen therefore that the views once so generally held as to the meagreness of the mineral fuel supply of Canada can no longer be entertained; and while it is not the object of this paper to enter into an abstruse discussion of the origin and mode of occurrence of the several sources of our mineral fuels, a sketch of the character, the location and possible value of some of the more important deposits may contain some points of general interest as regards the country's progress.

In discussing the question of mineral fuels a number of substances other than coal proper must be considered. The coals themselves include several varieties such as anthracite which is found along the eastern flank of the Rocky Mountains and to some extent on one of the Queen Charlotte group of islands in the northern Pacific ocean; the true or bituminous coals with their resulting coke, and the lignitic coals and lignites which are not capable of being coked, and which vary from brown to black and in quality from a fuel nearly equal to many of the true coals to others not far removed from peat. In addition to these, the minerals anthraxolite, oil-shale, albertite, and petroleum and natural gas must all be regarded as forms of fuel. They are often found in large quantities and at many widely separated points; while immense stores of peat, which in the manufactured or compressed state is now becoming an important factor as fuel in some parts of the Dominion is

without doubt destined in a few years to become a still more important national asset as a source of heat, light and power.

More especially will this be the case in those provinces in which the deposits of peat are large and of good quality and the distances from the coal centres great. These conditions apply to considerable portions of Ontario and Quebec to which the coal-fields of Nova Scotia should naturally furnish the fuel supply; as also to eastern Manitoba which is naturally dependent on the coals from the eastern slopes of the Rocky mountains or on the lignites of the great plains. As regards those provinces which contain an available fuel supply in coal the need of utilizing the peat deposits is probably at present not so great as to warrant the outlay of capital necessary for the erection of costly plants required for the manufacture of compressed peat fuel. In the following pages the distribution of the several varieties of fossil or mineral fuel, above referred to, will be indicated.

If we consider the geological horizons of the several coal deposits found in Canada it will be seen that these embrace a wide range, extending from the Devonian upward into the Tertiary. Of the other fuels, some of them range downward in the geological scale to our lowest rocks, anthraxolite, which is a form of carbon, being found in those of Huronian and Cambrian age. The geological horizons of the workable coals are however rather more limited, although even here the early ideas that the economic deposits of coal belonged especially to the Carboniferous time have been long since set aside, by the fact that much of the highest grade coals of the west or Pacific division, which compare most favourably with bituminous coals of the Atlantic slope, belong to comparatively recent rocks and extend through the Cretaceous to the middle Tertiary. These western coals present several varieties in the same field, the difference being due apparently to various degrees of alteration of the original deposit of carbonaceous matter.

Anthraxolite is more closely related to the rock oils or petroleums than to the true coals. It is found at a number of points in Canada and at widely separated horizons; and while not as yet materially increasing our fuel supply, is of interest both to the mineralogist and geologist. In its mode of occurrence it differs entirely from coal, in that it is always found in the form of veins which traverse strata of different ages instead of occurring as bedded deposits. From its presence in rocks of the Laurentian and Huronian systems as well as in the Cambrian and Silurian formations, it would, on the hypothesis that all bituminous substances are of organic origin, indicate that life, in some form, existed in the remotest periods of the earth's history. So also the

carbonaceous mineral graphite, which is found abundant in certain portion of the crystalline limestones and gneisses of the Laurentian, has been for many years regarded by some as also of organic origin. If this theory of organic origin for all carbonaceous and bituminous matter in the earth's crust is the true one the presence of anthraxolite in granite and other kindred rock; of graphite in diorite dikes; and of petroleum and its hardened form tar, in great masses of basaltic diabase without visible sign of sedimentary rocks in the vicinity requires careful consideration.

In point of age it is probable that anthraxolite takes precedence as the oldest form of mineral fuel. Thus, in Labrador it has been found in veins some inches in width, traversing the lower Cambrian rocks; in Quebec along the St. Lawrence, near Point Levis and on the Island of Orleans it occurs in pocket masses in slates and sandstone of upper Cambrian age; in Ontario it is found in large quantities in certain black slates of Cambrian or upper Huronian age at Chelmsford west of Sudbury, where on its first discovery it was regarded as an impure anthracite; in granite as veins of very pure quality near the Rideau canal north of Kingston; and in limestone of Black River age near Kingston city in association with veins of baryte.

In so far as yet proven the fuel value of this mineral has failed to be of much economic importance. Shortly after its discovery near Quebec attempts were made to mine it, and several cart-loads were extracted, the impression at that time being that a new coal-basin had been found. The mineral gave fairly good results as a fuel, but the quantity obtainable was insufficient to form a supply of permanent value. The occurrences in the Labrador peninsula are of course too remote to be of any use, while the small extent of the veins makes them practically valueless. At Chelmsford the thickness of the deposit is considerable, but its low powers of combustion and high percentage of ash cause its fuel value to be greatly reduced, and although attempts to mine the deposit were made shortly after its discovery the exploitation has long since been given up. As elsewhere the mineral at this place occurs in vein form.

Closely allied to anthraxolite in composition are petroleum and asphalt, as also to some extent the peculiar form albertite which was at one time largely mined in New Brunswick, the latter, however, being a mineral of exceptional purity as regards ash. As a class these minerals are quite distinct from the several varieties of coal proper, varying in a marked degree in the relative proportions of carbon, hydrogen, nitrogen and oxygen. They are also materially different as to origin, the coals being apparently formed in ancient peat swamps, entirely from vegetable tissues, while the minerals of the petroleum group are usually regarded as

derived, in part at least, from animal remains and in part from seaweeds, since in the Trenton time, in the rocks of which formation petroleum often occurs, land vegetation is not known to have existed.

In some areas where oil wells occur the oil has come to the surface and become thickened, forming what are known as gum-beds. This material was found in large masses in the Petrolea oil-field prior to the discovery of the oil itself in quantity. Masses of this thick and spongy oil have also been picked up in the vicinity of the oil-springs in eastern New Brunswick and in Gaspé, Que., but in the case of the albertite of the Albert mines in the former province this thickening of the natural oils must have recurred through some cause other than exposure, since this mineral filled a fissure in bituminous shales to a depth of 1500 feet with a length of over half a mile. The cause of the presence of this great mass of albertite has never been quite satisfactorily explained.

While for many years petroleum has generally been regarded as derived from organisms either vegetable or animal this hypothesis is by no means universally accepted. Some authorities contend that its presence is due rather to chemical changes in the rocks of the earth's interior as a result of the action of percolating waters on metallic carbides, and that the occurrence of petroleum even in fossiliferous sediments does not of necessity imply that these organisms were the original source of the mineral in question. This, however, is not the place to discuss the merits of the controversy.

In the matter of hard coal or anthracite the people of eastern Canada are to a large extent dependent upon the immense deposits of this variety which occur in the eastern portion of the United States, or upon the output of the Welsh collieries; but in all other varieties it will be found that Canada has an unlimited supply, much of which is readily accessible. Even of the anthracite variety it has been well established that the deposits found along the eastern slopes of the Rocky mountains as at Banff, are of excellent quality and of great extent.

Although the island of Newfoundland, politically, is not yet a part of the Dominion of Canada, from the scientific standpoint it may here be considered. The existence of coal-fields in the south-western portion of that province has been known for many years, but the deposits have never been opened up so as to furnish a supply of fuel either for local consumption or for export. The coal formation in this area may possibly represent the extension eastward of the Sydney coal-basin which may underlie the broad strait between the island of Cape Breton and the south-west extremity of Newfoundland. Along the line of railway which connects the south-west angle of the island with the city of St. John's other deposits of coal have been mined near the height of land in

the interior and used to some extent on this railway. The actual extent and value of these coal-basins have never been definitely ascertained. It is possible that these coal-bearing rocks may belong to the lower portion of the Middle Carboniferous formation and underlie the portion which in Nova Scotia carries the thick seams of the productive measures. This can only be ascertained by a carefully conducted series of explorations of the entire coal-basin.

In the underlying Devonian rocks which outcrop on the west coast of this island at Port au Port and further north at Parsons pond, at which places they rest upon Cambrian or Cambro-Silurian sediments, indications of petroleum are found, and borings have been carried on at both places for a number of years. So far, however, these attempts have not been successful in finding the oil in paying quantities, owing probably to the greatly disturbed nature of the containing rocks. The rocks in which the borings have been made are much faulted and in this respect do not fulfil the conditions supposed to be favourable to the occurrence of petroleum in quantity.

Beginning with the Atlantic provinces proper, it may be remarked that in Nova Scotia the coals are for the most part confined to the Carboniferous formations, and that the largest workable seams belong to the middle portion or what is usually styled the productive coal-measures. This formation is found in several portions of the province, notably at Sydney on the eastern coast of Cape Breton and in Richmond and Inverness on the west side of the island; at Pictou in the eastern part of Nova Scotia proper; and at Springhill and the Joggins which are in the north-west part of the province in Cumberland county. While several other deposits of coal are known to exist elsewhere they are, so far as can be ascertained, of but small economic value.

Seams of considerable size are however found in the underlying portion of the Middle Carboniferous, otherwise known as the Millstone-grit formation, and occasionally the mineral occurs in the Upper Carboniferous or as it is sometimes styled, the Permian, where coals of no great thickness have been recognized in that part of the counties of Colchester and Pictou which border on Northumberland strait. These small seams cannot, however, in the present state of the industry, be worked at a profit.

All the coals at present worked in the province are of the bituminous variety. Associated with these in the mines of Pictou county are occasional seams of a rich oil-shale known as Stellarite, which contains a very large percentage of bituminous matter which can be obtained in the form of oil by a process of distillation, resembling in this respect certain oil-bearing beds which are found as interstratified members of

the Albert shale series in New Brunswick. This shale is highly combustible and when ignited gives a strong flame with a great amount of heat. At present it is not utilized either for the production of oil or as a source of light, heat or power.

Although the coal formation has a wide distribution in the northern half of the province of Nova Scotia the southern portion is occupied by rocks of much older horizons, comprising great areas of granite with slates and quartzite, in which the gold fields are located. In this part of the province no trace of coals is found.

In the island of Cape Breton, the Sydney coal-field is the most important of those which occur in Nova Scotia. It extends along the eastern shore from Mira Bay on the south-east to Cape Dauphin at the entrance to Bras D'Or Lake. The land area of this basin is given by Mr. Hugh Fletcher as about 200 square miles, being thirty-two miles in length by six in breadth. The aggregate thickness of coal in the several workable seams varies from $13\frac{1}{2}$ feet in the Dauphin area in the northern margin of the basin to $44\frac{1}{2}$ feet on Sydney harbour, the seams ranging from three to nine feet in thickness. The dip is generally at a low angle seaward, so that a large area of submarine workings is available where mining is now being prosecuted on a large scale. The coals are all of the bituminous variety.

On the west side of the island in Inverness and Richmond counties large and important coal basins are located, the seams being thick and of good quality. Owing to increased facilities for shipment both by rail and water, these new areas have recently come into prominence and have become large producers and shippers.

On the mainland the thick seams of the Pictou basin have been producers of coal for more than eighty years. The area of productive measures is scarcely more than thirty square miles, but in this are comprised some of the largest seams in eastern America, the main seam in the Stellarton area having a thickness of forty feet with several others in the vicinity, of very large size. The Pictou basin is apparently more affected by faults than that of Sydney.

In the Cumberland basin as seen at Springhill mines, there are a number of seams many of which are over ten feet thick. These have been worked for more than thirty years while several others of workable size have been developed to some extent. The sales have increased from 10,000 tons in 1873 to nearly 500,000 tons annually. In the western part of this basin along the shore of Cobequid bay is the old colliery known as the Joggins mines. Here the seams are comparatively thin, the principal one worked shewing about five feet of coal, while the lower seam is somewhat less. These seams extend along the northern

margin of the Springhill basin, and along the outcrops are a number of small collieries which have been in operation for some years with varying results. These two seams of the Joggins section have not as yet been correlated with the workable seams of the Springhill area.

In addition to these areas the carefully detailed work of Mr. Fletcher in the last few years has revealed the existence of a possibly important coal-basin south-west of Springhill along the north flank of the Cobequid mountain range. The rocks of this area were formerly supposed to belong to the Millstone-grit formation, but a careful study of the district, both along the shore and inland, has led to the conclusion that they belong to the Upper Carboniferous series and overlie the productive measures in this direction. Acting on this theory the overlying series has recently been bored to a depth of over 2,000 feet and a coal-seam of large size has been struck. It is quite possible therefore, in the event of further borings confirming the first discovery, that a new and valuable coal-field may be opened in this area.

Among other small and comparatively unimportant coal-seams are those which occur in formations other than the productive coal measures, such as the small seams which outcrop on the south side of the Cobequid mountains at Debert and at several points in the vicinity. These occur in rocks of apparently Lower Carboniferous age which are much broken up, and the seams east of Truro at Kempton are probably of the same age. Of a still lower horizon are the small seams found along the railway east of Riversdale which are assigned to the Devonian, and several outcrops along the north side of the Bay of Fundy which may be of the same horizon. These small and for the most part, isolated basins give but small promise of successful development.

Boring for oil has been carried on in several parts of the province for many years. In the island of Cape Breton a number of holes have been put down in rocks of Devonian age, which are much tilted and otherwise disturbed; and though traces of oil have been found at several points no occurrences of economic value have yet been recorded. Quite recently borings made on the south side of Minas basin reached a depth of about 2,000 feet without finding an underlying coal or oil basin.

The province of Prince Edward Island does not shew the presence of coal seams at any point on the surface. The rocks over the whole island belong to the Upper Carboniferous or Permian formations and coal seams if existing at all must be sought for at considerable depths by boring at well chosen points. The only source of mineral fuel in that province is in the several peat bogs of excellent quality, but no attempt has ever been made to utilize these, and in view of the cheap transit from the Pictou and Inverness coal fields across Northumberland strait

it is probable that this province will continue to obtain its supply of coal from the Nova Scotia mines unless the contemplated borings should disclose the presence of underlying seams at a workable depth.

Passing to the province of New Brunswick it may be said that Carboniferous rocks have a very wide distribution and comprise an area of more than 10,000 square miles. They form a triangular area with the base along the eastern part of the province extending from Bathurst on the north to the Nova Scotia boundary line on the south, while the apex of the triangle is near the south-west part of the province. At many points throughout this area thin coal seams outcrop, and near the upper end of Grand Lake, where the coal appears to have the greatest thickness, it has been mined for nearly a century. The thickness of the main seam at this place rarely exceeds twenty inches but in places two seams unite, forming a thickness of two and a half feet. The annual output now amounts to about 40,000 tons.

The mining is done in a comparatively inexpensive manner without the expenditure of much capital in the erection of costly mining or hoisting plants; and while there does not appear to be any possibility of indefinitely extending the output, as in the case of the Nova Scotia mines, a fair amount of fuel can be raised for local consumption, and the output meets with a ready sale. Boring operations have been carried on throughout the coal basin for over sixty years, but have so far failed to find any underlying seams of greater thickness than the one so long worked. These coals are regarded as belonging to the Millstone-grit formation rather than to the productive coal-measures.

At various points in the province outside the limits of the principal coal basin small seams of coal are found, some of which belong to a different horizon. Of these, several outcrops in the south-eastern part near Northumberland strait, belong to the Upper Carboniferous formation but are of no practical value. At Dunsinane near the Intercolonial Railway, north of Sussex, seams, similar in character to those near Grand Lake, have been found near the surface, but though borings have been made at this place to over 1000 feet no deep seams have been discovered. They are probably of the same horizon as those of Grand Lake. In Albert and Westmorland counties and on the south side of Chaleur bay small and unimportant seams also occur but have never been mined, owing to their comparative insignificance.

An interesting occurrence of coal in the northern part of the province is seen in Devonian rocks on the south side of the Restigouche about two miles west of the town of Dalhousie. Here a sheet of igneous rock (diabase) has been injected along the bedding plane of the shale,

and overlies a seam of coal a foot in thickness, which has been altered to some extent along the contact. It has, however, no economic value.

In the southern part of the province, at Lepreau basin, a seam of graphitic anthracite occurs in Devonian shales. The enclosing shales are nearly vertical, and a large sum of money was spent some years ago in mining this deposit. The amount of impurity in the coal was so large as to render it practically useless as a fuel. Here it would appear that coal and shale originally bituminous, have passed into the state of graphitized carbon through heat induced by pressure. The thickness of the so-called bed was in places about four feet, and it was opened by shafts to a depth of more than 100 feet. All work on this area has long since been abandoned.

Among other sources of fuel supply in this province must be mentioned the Albert shales and the associated mineral Albertite. Rich beds of oil shale which by some have been styled Cannelite also occur as interstratified beds in the mass of the shale. The Albert shale formation has a thickness of over 1000 feet, the strata are usually highly inclined and there are numerous faults and occasional overturns. The Albertite, or Albert coal, as it was often called, occurred in the mass of this shale near the axis of an anticline, as the filling of a true fissure having a width varying from a few inches at the ends to about seventeen feet in the centre, decreasing in depth to the bottom of the deposit about 1500 feet from the surface. This vein shewed several faults, the mineral being thrown from side to side. It was mined to a depth of over 1200 feet, below which level the vein assumed a brecciated structure composed of fragments of shale cemented by the Albertite. For some years these shales were regarded as a part of the lower Carboniferous formations, but from their stratigraphical position as unconformably beneath the formation wherever they occur, they are now regarded as a part of the Devonian system.

The shales themselves are highly bituminous throughout. They contain interstratified beds of black and sometimes grey oil-shale in massive bands ranging in thickness from three to nearly twenty feet. These bands are exceptionally rich in oil, yielding by distillation from thirty to eighty gallons per ton. They burn in the grate with a bright flame, and some of the bands are so inflammable as to kindle readily with a lighted match. They can be mined like coal, and should form a valuable fuel. Though the amount of ash is large, varying from 45 to 60 per cent, the shales burn with great heat till the bituminous matter is consumed, and the resulting ash is claimed to possess valuable properties as a fertilizer. As a source of supply for oil by distillation these oil bands are

superior to those of the extensively mined deposits of Scotland, both in the ease with which the crude material can be extracted and in the percentage of oil contained in the shale itself. Attempts were made more than forty years ago to distil this oil from the shale bands, and a crude plant was erected and operated for several years with a fair amount of success, until the cheaper native oils of western Canada and of the United States so lowered the price that its manufacture by distillation became unprofitable.

The vein of Albertite was worked for twenty or more years, the amount of mineral extracted being more than 200,000 tons, which commanded in the market over \$20.00 per ton in the closing years of the industry. The gradual exhaustion of the main vein, both at the extremities and in depth, led to the cessation of work, but another vein has since been found which is a branch of the one worked and may prove valuable when opened up.

In connection with the Albert shales a large amount of capital has recently been expended in the attempt to develop a profitable oil field by boring. The first borings in this area were put down near the village of Memramcook about forty years ago, and yielded a small amount of petroleum, but the area never became a producer. Subsequent attempts were made by different parties in the area along the Petitcodiac river near Dover and at other points, and from sixty to seventy holes were put down, some of which reached a depth of more than 3,000 feet. In several of these holes a small quantity of oil was found, but so far the results have not been such as to warrant the erection of costly refining plants.

The shales in which these borings have been made are usually highly inclined and are affected by faults, so that while small quantities of petroleum come to the surface in the form of springs, possibly along lines of fracture, or may be found in certain bore holes by seepage, it has been fairly well shewn that these rocks do not readily yield oil except by distillation. The fact that in the workings of the Albert mine but slight traces of oil were found under what might reasonably be regarded as favourable conditions supports this view, since one would naturally infer that under such conditions as prevailed in this mine, with such large bodies of rich oil shale as were traversed in the workings, some good shewings of petroleum would be encountered.

Comparing the beds of Cannelite or rich oil-shale with true cannel coals it may be remarked that with the exception of the large amount of ash in the former there are strong points of resemblance. When burned in a grate or other suitable appliances the oil-bands furnish a fine fuel, though as already remarked the percentage of ash is high. There seems

to be no apparent reason why these beds should not some day be extensively used for domestic or manufacturing purposes, apart from their utilization in the distillation of the contained petroleum. The associated Albertite is apparently a highly altered or inspissated petroleum, the analysis shewing the merest trace of ash in composition.

The province of Quebec has always been regarded as entirely lacking in mineral fuel, and as regards coal this is practically true from the economic standpoint. Mineral coal does, however, occur in a small seam from two to four inches thick in the Devonian shales of the south side of Gaspé basin; and in connection with the same geological formation are a number of oil springs some of which are on or near the shore and others at a distance of some miles inland. The containing rocks in this area are as a rule, highly inclined and shew the presence of faults, near which several of the largest oil-springs are situated. Boring operations have been carried on at intervals in the vicinity of Gaspé basin for more than forty years, and have led to a vain expenditure, within the last sixteen years, of over one million dollars. Although a number of holes were sunk to depths ranging from 1,000 to 3,000 feet, several of which were in the immediate vicinity of the oil springs, no petroleum with the exception of small shewings was found. In all some 60 holes were bored in an area about thirty miles in length by ten in breadth. The same broken character of strata prevails throughout, and the shales and sandstone, while differing in character from those of New Brunswick, are closely related in geological time. Bands of rich oil-shale also occur in these rocks but not, so far as known, in quantity sufficient to incur the expense of development.

The Carboniferous rocks in this province are limited to a small strip of Lower Carboniferous age situated along the north side of Chaleur bay and quite beneath the productive coal measures of Nova Scotia, or the Millstone-grit areas of New Brunswick. The Devonian shales opposite Dalhousie near the estuary of the Restigouche river abound in the remains of fossil fishes, but no trace of petroleum has ever been seen in this area; while on the shores of Gaspé basin petroleum is found filling a cellular structure in a dike of diabase some 150 feet in width, which traverses the Devonian slates and sandstone of that district.

The veins of anthraxolite found in the Cambrian rocks of Labrador and near Quebec city have already been referred to as interesting from the scientific rather than from the economic standpoint. The recent development of the peat industry in this province as well as in Ontario bids fair to furnish for certain purposes a fuel which will to some extent supply the absence of beds of true coal.

The development of these peat bogs was begun about forty years ago in the country between St. Johns and Farnham near Ste. Brigide, and also near Bulstrode, Arthabaska county. Large deposits of excellent peat occur along the railway at both these places and were at one time exploited quite extensively in the matter of peat fuel. Being uncompressed it was not found to be suitable for railway work owing to the large amount of space required. Recently, however, this objection has been to a large extent overcome, and the peat, after extraction of the contained moisture down to within 12 to 15 per cent, is compressed into small cylindrical blocks having almost the hardness and consistency of coal. Peat bogs are extensively developed in many portions of the province, and when the process of peat manufacture is perfected, the new kind of fuel will doubtless to a considerable extent obviate the necessity of importing the soft or bituminous coals from the United States or Nova Scotia. The manufacture of this compressed peat fuel has reached the stage when the demand exceeds the present supply on the market and it readily sells at a good profit on the cost of manufacture.

The question of the utilization of the great deposits of peat applies to the province of Ontario and in large areas in Manitoba as well as to Québec, since in all these provinces this material occurs over large areas, much of which is convenient of access while coal deposits are practically lacking.

Turning to the province of Ontario, true coals are nowhere found, but deposits of anthracolite and lignite occur, the latter in the area south of James Bay where large supplies have quite recently been discovered and may some day be utilized.

This lignite of the Moose river basin is peculiar, in that it is found in Post Tertiary deposits of sand, gravel and boulder clay instead of in a solid rock formation as in the case of the lignites of the west. It is therefore the newest lignite formation known in Canada with the exception of certain small deposits that occur in clays on the north end of Graham Island, one of the Queen Charlotte group on the Pacific coast.

In spite of the newness of the deposits along the Moose river the seams, though in places somewhat irregular in deposition, are of considerable thickness. The lignite when dry burns readily and the deposit promises to yield, under certain conditions and for certain purposes, a fairly satisfactory fuel. It is of a brownish black colour and burns quite freely in an open fire. It cannot, however, compare in quality with the better or older grade of lignite of the Tertiary period, which is so abundant throughout the great plains of the west.

In addition to the lignite and peat deposits which have not as yet appreciably affected the importation of outside fuels, the deposits of petroleum which were first discovered in Ontario about 1860, and later the finding of natural gas in immense quantity, have added largely to the resources of the province as regards light and fuel. The first attempts at boring in the peninsula between lakes Huron and Erie resulted in the outflow of such large quantities of oil that millions of barrels were reported as lost through lack of appliances for saving it. This discovery, together with that of similar deposits in certain parts of the United States, soon closed down the small distilling plants which were manufacturing oils from the bituminous shales of the Utica formation found in the Lake Huron district, as well as from the Albert shales of New Brunswick.

The original field from which the Ontario petroleum was first obtained is still a producer of mineral oil, though as might naturally be expected the supply in recent years has materially decreased.

The discovery of natural gas about fifteen years ago in the place where petroleum was first known, and later in the Niagara peninsula, has largely affected the coal consumption in some districts. In addition to supplying the local requirements immense quantities have been piped across to the cities of Buffalo and Detroit on the American side of the great lakes. Exploration for both gas and oil is constantly going on and reported discoveries of fresh fields are occasionally announced. It is safe to say that as yet nothing has equalled in importance the great wells of the Petrolea district at the time of their first discovery.

With the exception of the peat and lignite deposits, already described, that portion of Ontario north of Lake Superior is, so far as known, lacking in mineral fuel, the rocks of this part of the province belonging for the most part to the oldest crystallines which extend into the province of Manitoba where they form the eastern shore of Lake Winnipeg and continue thence south-east across the Lake of the Woods into northern Minnesota. The finding of occasional veins of anthraxolite in these old rocks, a feature already referred to for the eastern provinces, sometimes gives rise to reports of the discovery of deposits of anthracite coal in this area, but so far as known the geological conditions of this part of the Dominion are adverse to any such conclusion.

Hitherto, in the investigation of this subject the highest or newest rocks of eastern Canada are of Triassic age. These are found in Nova Scotia and New Brunswick. In the geological scale these rocks are next in order above the Upper Carboniferous or Permian. But in the western half of the Canadian section, beginning with the great plain of Manitoba,

and extending across to the shores of the Pacific ocean, many of the rocks over large areas are of a more recent time, comprising Cretaceous and Tertiary sediments. In these the greater part of the coals of the western division are located. These comparatively recent formations constitute, therefore, an important factor in the geological problem, as well as in the distribution of the fuel supply of the Dominion.

In Manitoba and throughout the great plains east of the Rocky mountains, and extending northward down the valley of the Mackenzie river to the Arctic ocean, the rocks are largely of Cretaceous age. The district is underlaid in many places by large beds of lignite, the outcrops of which are seen as far east as Turtle mountain in the province first-named. Along the upper waters of the South Saskatchewan as also along the North Saskatchewan as far down as the settlement of Victoria these lignites are seen, sometimes in beds of great thickness and extent, so that the supply of this fuel must be simply enormous.

Passing still further west into the foot-hills of the mountain, as at Banff and as far south as the Crowsnest pass, the lignites change their character and pass into lignitic coals, bituminous coals and anthracites. The sections at these places shew a wonderful series of coal beds, which in the Crowsnest field aggregate at least 200 feet in thickness, many of the seams being of workable dimensions and of superior quality. Farther west the rocks of the mountain chain belong to an older series than those which contain the coals; but after passing this old series which comprises in part highly altered sediments and crystallines of various kinds, the next division westward from the vicinity of Sicamous, although for the most part igneous in character, contains isolated areas or basins generally of Tertiary rocks which carry coal in beds often of large extent and thickness. These are found at widely separated points, such as the upper part of the Peace river, the valley of the North Thompson, the vicinity of Kamloops, the Nicola valley, and the Tulameen and Similkameen district, all with the exception of the two first situated to the south of the Canadian Pacific railway, while to the north are the areas along the Marble cañon at Hat creek, a few miles north-west of Ashcroft and the Bulkley valley deposits farther north, situated to the south of the Skeena river. The greater part of these coals are of the coking variety, while the lignites are of excellent quality.

On the Pacific coast itself there are great deposits on Vancouver island of Cretaceous age which have been mined for nearly half a century, and which at the present time are the only producing areas on the Pacific slope in Canada; while further north, on Graham island, which is the most northerly of the Queen Charlotte group, several varieties of coal are found, including anthracite, high-grade bituminous and lignite. With

the exception of attempts to work the anthracite on the south coast of the island, which, however, have not been productive of economic results beyond the sinking of a few shallow pits in prospecting work in connection with the development of the great seams of bituminous coals of the interior, but little work has been attempted. This field promises to be of great value in the not distant future.

The occurrence of these several varieties of coal in rocks of practically the same geological horizon is interesting, since it is probable that at one time all these newer coals existed in the form of lignite. Thus it has been pointed out by Dr. G. M. Dawson that as we approach the foot-hills from the plains, and thence continue westward into the mountain range at Crowsnest and at Banff, the percentage of water in the lignite gradually diminishes and the coal gradually passes through lignitic coals into the bituminous variety and thence to semi—and to true—anthracite, the change being more marked in all cases as the containing rock formation is more and more uplifted and pressed together or approaches the vertical. It would appear therefore that the alteration of the coals is to a large extent due to heat induced by pressure during the epoch of mountain making, and when the uplift of the Rocky mountains was being effected. For some miles east of the range itself there is a series of folded and titled beds in which the lignitic character of the contained coal has practically disappeared.

The change in the character of the coals may also, to some extent, be due to the relative position of the several seams seen in the section, since the higher grade coals may represent beds from the older or lower portion of the Cretaceous formation. The lignite of the North Saskatchewan belongs to the Laramie or upper part of that system of rocks, but here the strata are comparatively undisturbed. The difference in the character of the coals does not however depend entirely upon the geological horizon, since in the interior basins of British Columbia, many of the Tertiary coals are highly bituminous instead of lignitic, while on Queen Charlotte island, the Cretaceous coals range from high grade bituminous to broken and shattered anthracite, largely through the alteration induced by rock movements, but also probably to some extent by later intrusions of igneous rocks in the immediate vicinity.

The thickness of the coal-bearing strata along the eastern side of the Rocky mountains aggregates several thousands of feet. The sections exposed in the vicinity of the Crowsnest and near Banff along the valley of the Bow river, shew the presence of numerous coal seams some of which are of great thickness. In a section published by Mr. J. McEvoy, (see Rept. Geol. Sur. 1900) the total thickness of the coal-bearing formation exposed along the Elk river amounts to 4,736 feet, and the

coal seams exposed have a total thickness of 216 feet. Of this thickness of coal it is remarked that 198 feet occur in a thickness of 1,847 feet of strata, and of this coal, making allowances for shale partings and impurities, it is estimated that 100 feet are available for mining. The thickest beds in the section are 36, 46 and 46 feet respectively.

Another section measured along the south fork of Michel creek gave 55 feet of coal, and on Morrissey creek 68 feet, all in beds of workable size. In sections measured by Mr. Leach near the divide between Elk and Fording rivers there were found 3,386 feet of coal strata containing $89\frac{1}{2}$ feet of coal, the greater part of which was in beds of workable size, the largest bed having a thickness of $35\frac{1}{2}$ feet. In a section measured by Mr. T. Denis near Michel creek, in a thickness of 921 feet of strata there were $69\frac{1}{2}$ feet of coal the thickest seam being 25 feet with a thin shale parting. It is evident therefore that the quantity of coal in the Crowsnest basin is inexhaustible, the amount estimated by Mr. McEvoy for an area of 230 square miles, owned by the Crow's Nest Co. alone being no less than 22,595,200,000 tons.

In the Banff district which is traversed by the main line of the Canadian Pacific railway, several coal crops occur along the Bow river, some of which have been worked for a number of years at the mines of Canmore and Anthracite. In this area about fifteen seams have been recognized though none are of such huge dimensions as those in the Crowsnest Pass. The geological formation is to all intents the same, belonging to the Cretaceous. No detailed sections of these Bow river coals have yet been published, but sufficient is known to warrant the statement that the area is a very important one. Beds of semi-anthracite have been opened up having thicknesses of 12 to 15 feet. The coal differs from the bituminous variety of the Crowsnest on the one hand, and from the lignites on the other, in having undergone a greater degree of metamorphism. The anthracitic and bituminous varieties are found in this field, the difference being due to the amount of alteration to which the original lignite was subjected. These two great coal-basins will be able to supply the greater part of the territory between the mountains and the city of Winnipeg, where a higher grade of fuel than the lignite of the plains is required. These coals extend northward to the upper waters of the North Saskatchewan and Peace rivers.

Between the Crowsnest and Banff the coal formation extends along the east flank of the mountains, and large deposits of coal are already known to exist which have not yet been opened up; while northward in the direction of the upper waters of the Peace river large coal seams have also been reported. In the present unopened state of the country in this direction these seams are as yet practically valueless, but

will in the near future without doubt be thoroughly exploited. In none of the rock sections of these coal-bearing strata has any trace of coal so far been found in sediments of Carboniferous age.

The coal areas of Vancouver island have for many years furnished the great bulk of the coal supply for the Pacific coast not only in British Columbia but as far south at least as San Francisco, where it competes with the inferior coals of the states of Washington and California. The Vancouver coals are apparently all located on the east side of the island, and though coal-measure rocks and small indications of coal occur at a number of places towards the northern extremity, the mining centres are still confined to three localities, viz., Comox, Nanaimo and Ladysmith, the original collieries at Wellington having recently been abandoned after being worked for nearly half a century. The coal-bearing rocks of the district are all of Cretaceous age, and the coal itself is generally a high grade bituminous variety, the seams varying in thickness from two to eight feet. A peculiarity of these seams is the frequent change in size, owing to local thickening or thinning out, generally due to small faults, rolls or slips, so that a seam which may be worked for a time with a minimum thickness of three to four feet may rapidly increase to fifteen or even twenty feet.

Though small seams of coal or sometimes lignite have been reported from several of the local basins to the north no precise details can be given, other than that the containing rocks are of Cretaceous age.

On the mainland of British Columbia coals of several kinds are also found at widely separated localities. Most of the deposits as already indicated occur in isolated basins or valleys, the associated sandstones and shales in most cases resting upon volcanic or igneous rocks which resemble closely those seen along the west side of Vancouver island. The greater portion of these inland coals are bituminous rather than lignitic, though the latter is also found both as lignite and as lignitic coal.

Along the lower Fraser, and between this and Burrard inlet a basin of Cretaceous or Tertiary rocks occurs. This may indicate the eastward extension of the Vancouver coal-series. Good exposures of the sandstones are seen on the shores near Vancouver city and in the city itself. Coal indications are seen at different places on or near the line of the Canadian Pacific railway for more than thirty miles east, but no seams of workable size have yet been discovered. Very little boring has yet been attempted to prove the actual value of this basin, and it is therefore impossible to say definitely whether workable deposits do or do not occur. In a report by Dr. Dawson, 1877-78, he states that "bunches of good bituminous coal are known to occur not far from Chilliwack village, as also similar occurrences in the Cultus range of hills which skirt the Sumas valley."

Brief allusion has already been made to the presence of coal basins south of the Canadian Pacific railway where several basins of Tertiary sandstones and shale containing large deposits of excellent coal occur. Among these may be mentioned the seams which outcrop at several points in the valley of the Nicola river and lake, an area lying about fifty miles south of Kamloops. This district is now being opened up by a line of railway south from the Canadian Pacific at Spences Bridge to the Similkameen valley. The Nicola coals have usually been referred to as lignites, but the analyses of specimens from the outcrops on the Coal gully, the Coldwater and from Quilchena shew them, at all these places, to be bituminous coals of good grade, yielding an excellent coke. In these basins a number of seams outcrop, of which on the Coal gully there are at least four that range in thickness from five to eighteen feet; on the lower Coldwater the seam exposed and partly opened has a thickness of over seven feet; and on the Quilchena south of Nicola lake, where several seams outcrop, ranging from two to fifteen feet in thickness. These coal basins are of considerable extent and must contain a large amount of very excellent fuel, of great value in view of the recent railway extension and the development of the copper and other mines of the district. From this area a large part of the fuel supply of British Columbia will doubtless be obtained.

To the south of this basin are the areas found along the Tulameen and Similkameen rivers about fifty miles distant, but directly on the lines of railway now being constructed through that part of the province. The analyses of the coals from the former place shew them in part to be high-grade coking coals and not lignite as once supposed, but at present the extent of this basin has not been definitely ascertained. At the junction of this stream with the Similkameen several seams have been located, ranging from one to over eighteen feet in thickness, but these are rather of the nature of a high grade lignite or lignitic coal than a bituminous coal. The deposits in this place are however important and will be extensively utilized as soon as reached by the new line of railway. It is also quite possible that in the development of these seams the character of the fuel will change for the better, a feature which has been found in other fields in British Columbia, such change being due to the greater amount of metamorphism which the original lignite has undergone.

These deposits are all south of the present line of the Canadian Pacific railway, and will doubtless be important factors in the development of the various mineral industries and smelters, since they represent the greater part of the good coking coals of south-western British Columbia. They occur in sandstones and conglomerate with interstrati-

fied shales which overlie the great mass of igneous rocks in the vicinity, and part of these at least are not capped by volcanic overflows as was at one time supposed to be the structure. The coal formations in this area are of Tertiary age while the underlying igneous rocks are probably Triassic.

South of Sicamous junction, and much further east than the areas just described, is a deposit of coal recently discovered near Enderby on the branch railway leading to Okanagan lake. The extent of this deposit has not yet been definitely ascertained, but the quality of the coal as judged from the samples appears to be excellent and preparations are now being made to prove its actual value. Should the quality prove good the area will be important from its accessibility to the main line of railway.

About three miles south of Kamloops several thin seams of bituminous coal are seen in the bank of a small creek, associated with shales and apparently overlaid by volcanic rocks. In so far as developed these seams are too small to be of much economic importance. They probably represent the southern edge of a basin which extends across Kamloops lake and along the lower part of the North Thompson but which has never been tested by boring. About forty-five miles north, on this stream a basin of similar rocks occurs in which are several seams of good coal of the coking variety, but the distance from shipment and the present observed thinness of the coals has hitherto prevented development.

Among the largest of the lignitic coal deposits, which, as well as the lignites proper, can be distinguished, among other things, by their lack of coking properties, that on Hat creek near the Marble cañon, about fifteen miles north-west of Ashcroft on the main line of the Canadian-Pacific railway may be mentioned. Here, in a section measured by Dr. Dawson, (1877-78) a bed of high-class fuel, which from the small percentage of water obtained on analysis may almost be classed as a true coal, is found, the thickness of the bed exposed in the creek section being 68 feet, though the lower part could not be seen. This coal is also of Tertiary age.

Further north in the Peace River district a number of coal outcrops were observed by the early explorers. Some of these coals were found to be lignitic but others were true coals of excellent quality. Other deposits have since been discovered so that in the district about the head waters of the Peace river good coals will undoubtedly be readily available when the opportunity offers for their successful development.

Both lignite and true coals are found in northern British Columbia both south of the Skeena river and northward at intervals into the territory of the Yukon. Of these probably the most important yet ex-

amined occurs on the Telkwa river in what is known as the Bulkley valley, about 100 miles south of Hazelton on the Skeena, where at least five seams of coal ranging in thickness from $2\frac{1}{2}$ to nearly 20 feet, of excellent quality have been found within a convenient distance of the proposed line of the Grand Trunk Pacific railway. Like the area south of the Canadian Pacific the formation in this basin is also Tertiary, the coal-bearing rocks being apparently underlaid by igneous rocks. These coals are in part high-grade bituminous and in part a semi-anthracite. The full details of the seams have not yet been announced, but if they should continue as reported across the basin of sedimentary rocks the quantity of coal in this area must be enormous.

In the Yukon district coals of good quality have been found at several places. Among other localities the Klondike river shews Tertiary coal-bearing rocks for a distance of about sixty miles. The fuel is of the lignite variety and outcrops on Rock and Coal creeks, and on Cliff, Twelve and Fifteen mile creeks the area underlaid by the coal being estimated at about 200 square miles. The quality of this fuel is reported as fairly good. There are several seams exposed and two outcrops on Cliff creek with thicknesses of nine and three feet respectively, have been opened up to some extent.

Lignite also is found on the Lewes river above Rink rapids and a deposit of anthracite coal has recently been discovered near the line of the White Pass railway near Dugdale station, not far from the Whitehorse copper district. This may possibly prove on development to be of economic value.

Coal was first reported by Mr. William Ogilvie as occurring on the Pelly river in the Yukon district some years ago, the mineral being of good quality and in seams from five to seven feet thick. The difficulty of exploration and the expense of transportation render the development of these deposits somewhat uncertain, at least for some years.

One of the largest coal-fields on the Pacific coast is found on Graham island, the largest of the Queen Charlotte group. Attention was directed to this area nearly fifty years ago through the finding of a bed of anthracite on the southern end near the head of Skidegate harbour. Attempts were made at intervals for nearly thirty years to mine this coal for shipment, but owing to the fact that it was greatly crushed and in places reduced to powder on removal as a result of dike intrusions and rock movements, all efforts to find a productive mine were unsuccessful and the property has long since been abandoned. A similar anthracite occurring under like conditions is found about seven miles inland and has been slightly opened up but not worked.

Along the north shore of Skidegate harbour, extending westward for some ten miles from Skidegate village there is an almost unbroken series of Cretaceous rocks comprising shales, sandstone and conglomerate. These are cut by diorites at several points. The stratified members of the series extend northward across the island and at several points carry large deposits of coal which outcrop principally at two points inland, one about eight miles from the shore, the other at fifteen miles. The strata show the presence of several anticlines and near the contact with the igneous rocks are somewhat altered.

The two coal outcrops have been opened to some extent. The more southerly one is known as Robertson Camp, the northerly as Wilson's. At the former place the coal is seen in two seams of workable size with a shale parting of eight to ten feet, and at the Wilson camp one large seam with a thickness of about eighteen feet with a shale parting of one foot only, near the lower part. The extension of these seams has never been ascertained by boring owing doubtless to difficulty of access in a densely wooded country which at present is merely by trail. That there is a very large quantity of excellent coal in this part of the island is evident. The general dip of the coals at both camps is to the north-east at a moderate angle, or away from the hilly country which forms the western half of the island, where the formation is volcanic. It is therefore probable that the seams exposed extend eastward in the direction of the dips and should be traceable along the strike north-east and south-west.

In addition to the bituminous coals, which are of high grade, there are in the northern and eastern portions of the island large areas of Tertiary rocks in which moderately large seams of lignite are known to occur. These, however, will scarcely be utilized in view of the presence of such large supplies of bituminous coals which are easier of access and have greater facilities for shipment. The extent of these lignite beds in the northern part of the island could easily be ascertained by boring east of Masset.

Along the lower part of the Mackenzie river there is a large development of coal-bearing rocks in which seams of lignite occur and these also outcrop on several of the islands off the mouth of that river. No attempt has yet been made to ascertain the extent or value of these deposits.

The observations in the preceding pages have shewn clearly that in the western half of the Dominion the supplies of mineral fuel are practically inexhaustible. The analyses of these coals shew that their quality is greatly superior to those now mined in the Pacific states of the American union.

From a comparison of the coal-fields of the Atlantic areas with those of the Pacific slope and even as far east as the great plains, it will be readily seen that their geological horizons are quite distinct. Thus it has been pointed out that all the western coals are of comparatively recent date, while those of the east belong to the Carboniferous formation and in places closely approach even the Devonian. This discrepancy in horizons continues southward throughout the United States into Mexico, large deposits of coal, both of the bituminous and lignite varieties, occurring in the area between the Mississippi and the Rocky mountains in rocks of Cretaceous age, though in several of the states west of the Mississippi coals also occur in rocks of the Carboniferous formations. In eastern Asia, in China and in Japan, immense deposits of excellent bituminous coal are also found in the Cretaceous and Tertiary formations, in the latter of which also large quantities of petroleum occur.

In eastern Canada, on the other hand the petroleum is principally found in rocks of Devonian age, though the original source of this oil, by those who advocate its organic origin, may be in some lower series; while in the case of natural gas the largest occurrences are apparently from Silurian rocks or possibly from even a lower horizon. In the west, however, wherever oil or gas occurs it is found, like coal, in association with the more recent formations, and throughout the country of the plains where boring for oil or gas is now being carried on and where the latter has been found in large quantity as at Medicine Hat, and further north along the lower Athabaska river, such borings have all been confined to the Cretaceous. The outflow of natural gas from the borings made along the Athabaska in the Tar sand formation is something enormous, the force of the discharge being such that the drill rods could not be sunk beyond a certain depth, though but little petroleum was encountered. Natural gas in the country east of the Rocky mountains will eventually become an important factor in the fuel supply of the west. It has been found in large quantity as at Medicine Hat, Calgary, Edmonton, and further north along the lower Athabaska river such borings have all been confined to the Cretaceous.

Although borings for oil have been carried on for several years along the eastern flank of the mountains as in the Pincher Creek district the strata have been too much tilted and faulted to serve as reservoirs and the operations have so far not been crowned with success. The fact that the oil-fields of Florence in Colorado are situated in rocks of the same age as those which occur along the east side of the mountains in what is known as the Pierre shale formation, lends strength to the suggestion that at some time and in certain localities, similar oil-fields will



be discovered in this direction on Canadian territory. So far no oil deposits have been found on the Canadian coast of the Pacific or in any of the interior coal-basins, though but a limited amount of boring has ever been attempted in these rocks till within the last two years.

XVI.—*A Short Chapter in Comparative Physiology and Psychology.*

By PROFESSOR T. WESLEY MILLS.

(Read May 23rd, 1906.)

1.—*Observations on the Habits and General Psychic Behaviours of certain Birds in Confinement.*2.—*Physiological Experiments; Psychological Experiments, etc.*

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During the past three years I have been able to keep under observation for a considerable period, three sea-gulls, a hawk and a crow, and it is upon observations and experiments on them that the present paper is founded. For the hawk and the sea-gulls I am indebted to medical students of McGill University. The crow was secured for me by one of the physiological staff, Dr. A. A. Robertson. The gulls were of the black-headed variety, and the hawk was a common hen-hawk.

HABITS.—THE SEA-GULLS.

These came into my possession on October 8th, 1904. They were at once put into a fairly large apartment enclosed by wire netting in which I also kept pigeons. In this enclosure there was always a large dish of water. The gulls could not be induced to eat for three days, but on the fourth they accepted a little fish and meat. The food was always put in the water. After the lapse of ten days they would come towards the dish as soon as food was put into it and they soon consumed in all about one pound of meat or fish daily. Bread and grains were only taken in case of extreme hunger, and then in small quantities. They were fond of fish and meat, but were specially partial to mice, which they swallowed whole. They bathed very freely in the water supplied to them. From the first they attempted to bite when handled, and could do so most effectively.

THE HAWK.

This bird was brought to me on September 10th, 1903. He was at once placed in a large cage made of very strong wire in which he was kept in the Laboratory till his death, on February 4th, 1904. He

was always restless and did not seem to get appreciably tamer.. The manner in which he dashed himself against his cage was recognized as fraught with danger, and I was not surprised to find on post mortem examination evidences of an inflammation of the membranes of the brain. There was also found a blood clot of considerable size in the bulb. and a smaller one between the cerebrum and cerebellum, so that it was likely his death was caused by pressure on the vital centres of the bulb.

The bird would not eat bread or grain under any circumstances, but was fond of raw meat, fish, and above all rats and mice, which he preferred alive but did not refuse when dead. The manner in which he dealt with rats and mice was something which, when once witnessed, could never be forgotten. Though not a large or heavy bird he could at once master and speedily kill the largest rat. When a rat or mouse was put into his cage, he at once seized it with both claws and literally squeezed the life out of it, perhaps driving his beak into it at the very moment he seized it, but in any case he very soon proceeded to tear the creature to pieces and devour it, often eating the head first. Till I saw what happened I had no idea that a bird of this size could exhibit such power to destroy life rapidly. His action in these cases was of amazing rapidity. Mice he often ate whole. On one occasion he was given four half-grown rats one after the other. This was a severe test, but he was equal to the occasion, and in a few seconds they were all *hors de combat*, and a little later dead.

The intestinal tract of this bird had extraordinary ejective powers, fæces being spurted two or three feet away. Hair balls were occasionally passed *per rectum*. All the facts tended to illustrate the striking rapidity of action and the strength of his neuro-muscular mechanism, whether the muscle involved was striped or unstriped.

THE CROW.

This bird came into my possession on December 1st, 1905. Though he was not an old bird, as it seemed to me, and had been in confinement for some time, he was unexpectedly wild and restless, and has remained so or with comparatively little change in spite of the fact that two operations had been recently performed on his cerebrum. What surprised me most was the above and certain resemblances he showed to the hawk.¹

¹ I have learned since the writing of this paper was begun that this bird was caught when still young in the spring of 1905, that he was allowed the freedom of the house, was accustomed to hide things and appeared to recognize his mistress who fed him but took no special notice of other people.

While he would eat almost anything usually offered animals as food, he preferred flesh, and still more fish, but above all mice, which he swallowed whole when not very large. I have no doubt he would deal with live mice as did the hawk, but I have not been able to test him as to this thus far. He held down with his claws and tore mice and rats to pieces much in the same way as the hawk, but without that bird's great power and rapidity of action. Like the sea-gulls he would bite severely, if given the opportunity, on attempting to handle him. He has been throughout kept in a cage like that used for the hawk.

EXPERIMENTAL.

Having made experiments on pigeons, extending over some years, especially with reference to the question of cerebral localization and the results of removal of portions of the brain, I was anxious to extend these experiments to other birds, more particularly those like the hawk of extraordinary power of feet and beak. I regret that I did not carry out experiments on this bird, but I found him so interesting to study psychologically that I was diverted from the physiological, which I hoped might receive attention later. On the gulls and the crow, however, I can report some results.

1. On April 3rd, 1905, one of the gulls was with some difficulty put under ether. The anæsthetic effect was with difficulty brought about and maintained. The action of the drug on the heart was pronounced, the sounds being rendered so distinct they could be heard some feet away, reminding one of a steam launch in the distance. Under no strength of current could movements be produced by stimulation of any part of the cortex that could be reached, in spite of free exposure of a large surface. In other words, the result was wholly negative so far as cortical cerebral localization is concerned. Then a large portion, weighing 15 grammes, was sliced away. There was not much hæmorrhage and the wounds healed rapidly. On the day following the operation examination showed that the bird was palpably blind on the side opposite to that of operation. He was a little shaky on his feet, but seemed as fearless as before and showed his usual inclination to bite, but he took no notice of mice as he did prior to operation. The bird did not eat of his own accord, but was fed with raw meat and water was poured into the gullet through a funnel. The meat was regurgitated.

On April 6th, bread and milk was fed artificially and well retained. It is observed that to compensate for his blind eye he turns the head about much more than is usual.

On April 13th feeding with grain was not successful, the food being regurgitated. In order to make sure of having the brain in good condition for microscopic examination the bird was killed on May 3rd.

2. The second gull was lost as an attempt was made to put him under the influence of chloroform, ether having proved unsatisfactory in the other case.

3. The third gull was tested on April 23rd, 1905, the anæsthetic being the A.C.E. mixture. A considerable surface of the cerebrum being exposed, on stimulating an area situated well forwards and near the middle line, the following were the results:—

- (i) Opening of the lids of the eye of the opposite side.
- (ii) Drawing down the nictitating membrane.
- (iii) Dilatation of the pupil.

The bird a few days after ate spontaneously and seemed in no respect the worse of the operation. But things did not go on well and death ensued on May 2nd. An examination revealed the presence of pus and a blood clot.

THE CROW.

The bird was readily put under the influence of ether and was kept at the right degree of anæsthesia without any difficulty. A surface on the right side of the cerebrum as large as a ten cent piece was laid bare. Stimulation with various strengths of current, including such as could not be borne on the hand, produced no movements of the head, wings, legs, or, indeed, any results other than eye movements such as have been almost invariably readily obtained by me in various birds, viz.: Movements of the lids, nictitating membrane and iris; best marked and most constant on the side opposite to that of stimulation, though not invariably confined to that side.

The portion of the cortex indicated above with enough of the white matter beneath to expose the corpus striatum was removed. The part cut away weighed six grains. The results, on stimulation with a current that could be distinctly felt on the moistened finger and that could not be borne on the lip, were in marked contrast to the negative ones obtained from the cortex. There was distinct extension of the toes of the opposite limb and movements of the head to the opposite side. These effects were decided, readily obtained and easily reproduced. The bird recovered from the anæsthetic quickly and in a few moments was able to sit on his perch.

On the following day no change of a physiological character was manifest, but both the laboratory attendant and myself were of opinion that the bird seemed wilder and snatched with greater eagerness at any food presented to him.

Attempts to determine his visual condition were not successful as the bird was not sufficiently quiet to permit of accurate tests being made, but, so far as could be observed, his vision was unaltered. However, it would be safer to draw no conclusion in this instance. The bird fed from the first as usual and continued well.

On March 21st a second operation was performed. This was substantially the same as the other and with similar negative results as to stimulation. The region exposed, over an area as large as in the other case, was removed, when stimulation of the underlying parts gave the same results as in the first experiment, viz.: movements of the toes and head. The portion cut away weighed seven grains. In this instance also there was very speedy recovery from the ether. The bird at once jumped upon his perch, and as he behaved as usual when I moved my hand towards him, there seemed no reason to believe that there was any serious change in his visual powers. Up to March 24th he seemed more excitable, but in a few days again became natural in this respect. The only marked changes of any kind in the bird from the time of operation to the date of writing, May 18th, may be thus briefly stated:—

1. Periods of greater excitement following each operation.
2. Decrease in weight; the bird weighed 335 grammes at operation, and on May 16th, only 254 grammes.
3. Decrease in strength. This last was evident this morning (May 18th), when an opportunity presented itself to judge of his behaviour on a live mouse being presented to him. The mouse, when dangled over the cage, at once attracted his attention and an immediate attempt was made to seize it. When the creature was put before him it was at once seized and shaken, as a terrier might a rat. The bird evidently appreciated the fact that the creature was alive, for at no time did he allow it to escape from him. He soon proceeded to attempt to tear it to pieces, holding it between the feet on the perch—but throughout his loss of strength was evident. The loss of weight and vigour was not due to lack of food, for he has always fed abundantly, but it is in harmony with a large experience of mine in keeping pigeons after removal of portions of the cerebrum. There was at no time any clear evidence that this crow was, except in these particulars, physiologically in any way disturbed, while he was psychically the same bird as far as my observations carried me, and as the experiments

described later, indicated, he had, to say the least, powers of psychic discrimination of no mean order.

OBSERVATIONS AND EXPERIMENTS ON THE SEA-GULLS.

It should be noted that these birds always remained on the floor of what was practically a big cage, about 6x6x7 feet. One of the birds was considerably larger than the other two, and of him they seemed to be afraid, and with reason, for he was anything but amiable in his behaviour. At the time the experiments to be described were begun the birds had evidently learned to associate food and the large water dish or trough very thoroughly, for as soon as it was placed in the enclosure (cage or pen) they approached, but the larger dominant bird nearly always did so first, and the others seemed to have learned to expect this.

Experiments based on the approach of other persons than the man that usually fed the birds were negative, *i.e.*, there was no evidence of recognition.

The trough being removed and emptied was replaced when the birds at once came and looked into it. The trough was then removed and in its place was put an empty metallic water pail of the usual size. The birds approached cautiously and seemed somewhat afraid of it, pecked at it and tried to upset it. After a few moments they looked over the top of the pail. This was then replaced by a smaller pail into which they could see with ease, but with no results appreciably different. Food was then put into this vessel, which was filled about two-thirds full of water; on the surface floated bread, while on the bottom was meat completely covered with bread. Again the birds approached, the large one being as usual in the lead. He pecked at the pail, tried to upset it, then looking into it he suddenly seized a piece of the meat and bolted it, at once withdrawing to some distance. The others, after some little time, came forward, but did not seem inclined to investigate. The pail was now removed, the trough placed in its usual position when the birds at once greedily devoured the meat it contained.

Five days later the following experiment was made: A dark coloured enamelled dish was partly filled with water and in it were placed bread and meat, the latter being in the centre and covered with paper of a light yellow colour, the bread filling in all the rest of the space. The leader approached cautiously (or timidly?) and then stepped backward, at the same time keeping his fellows away. He seemed to be looking for something he did not find. Presently he took

some of the bread, pecked at the dish and then looked into the trough from which the birds were usually fed. The paper was then removed by us when at once two of the gulls bolted the meat.

Next day the experiment was repeated. At once one of the smaller birds snatched the paper away and attempted to devour it. The larger bird seemed more cautious, he stepped forward pecked at the pan and at once stepped back. This experiment was repeated on two occasions afterwards, on both of which the smallest bird seized the paper and made persistent attempts to tear it up and to swallow it.

A piece of meat was wrapped in white paper, when this same bird attempted to swallow the paper, apparently not being aware that the meat was in it till it fell out when it was at once bolted, but just after the paper also.

Next, meat was placed in red flannel and placed in water surrounded by bread in the usual way. At once the smallest bird that had been so ready to act before, seized the flannel, and running off screaming tried to swallow it. These efforts were persistent.

Two days later the birds did not seem very eager for food though intentionally kept without it the day before. Pieces of meat were wrapped in paper of various colours,—pink, yellow, blue, and also in one case in black cloth. These were put in a dish containing water and with bread floating in it as usual. They pulled out the pink package first, then the yellow, next the black cloth, and finally the blue paper. Though they pecked vigorously at the paper they did not seem to be aware of the presence of the meat, and no attempt was made to secure it when it dropped from the paper on the floor. It was picked up, then dropped again suddenly, the paper apparently receiving more attention than the meat.

Meat was then placed in the feeding trough, but was not taken up, the birds seeming to be more inclined to enjoy bathing in the water than eating. One of the birds was not in good physical condition, so it was decided to discontinue these experiments, in all of which I had been sympathetically assisted by Mr. G. E. Lannin, an undergraduate in Medicine of McGill University.

CONCLUSIONS:

1. It is difficult to believe that smell was well developed in these gulls, but vision, including colour vision, was good.
2. Coloured papers seemed to exert some peculiar and attractive influence over them. This fact makes it difficult to draw safe conclusions in regard to the question of a colour-food association or reflex.

3. There was a firmly established trough-food association of some kind.

4. Individual differences were strongly marked.

5. This as a whole obscured and complicated the problem of relative individual mental superiority.

6. Gulls in confinement have not proved themselves of a high order of intelligence. As compared with the crow they were absolute "duffers."

EXPERIMENTS TO TEST THE BEHAVIOUR OF THE CROW UNDER CERTAIN CONDITIONS.

These were begun on April 28th, *i.e.*, about five weeks after the last operation on the cerebrum, none having been made previously.

It was proposed to note the bird's reaction to a colour-food stimulus, as, perhaps, the test may be designated. For this purpose the following simple mechanism was arranged: On a piece of thin board five and a half inches square were fastened immovably and parallel to each other, two inches apart, two cardboard boxes (in which packets of litmus paper had been kept). Each measured $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{2}$ inch; one was blue and the other red. At first an attempt was made to apply the tests in the morning before the bird had been fed, but he was so utterly wild that everything was thrown about and discriminating observation impossible; but by allowing him to feed moderately better results were obtained. Food was put now in one box, now in another, so that the bird might learn if he would the box-food combination. The apparatus was laid in his cage in front of his perch so that he could readily see and equally readily pick up the food placed in one or other box. On two successive days the food was placed in the red box and left uncovered. After this the food was always covered by paper of the same colour as the box itself, and this filled rather closely, so that it was not possible to see under it from the sides.

The results were as follows: For three days the bird not being previously fed on the same morning, it was found absolutely impossible to make observations of any special value, though they were attempted, but on the fourth and later days when there had been previous feeding, the following notes were taken:—"May 4th: Food placed in the red box, each being covered with paper of its own colour and so placed that the red was on the left side of the observer when facing the cage. The crow took the blue paper off with his beak, but pecked just after at the red paper. He soon pecked again at the red paper and *attempted to look underneath it*. In this case his interference had

so altered the position of the uncovering paper that he could see the contents of the box (meat), which he at once seized and ate.

May 5th: Accidental exposure of the contents of the box; experiment not successful.

May 7th: The red box was placed on the left. As soon as the apparatus was placed in the cage, he lifted the red paper up somewhat, peered underneath in a most suggestive and amusing way, and lifted out the food very gingerly.

May 8th: The red box was placed to the right. Though he looked plainly to this box first, he took the blue paper off the blue box and began to tear it up. A few minutes later he knocked the red paper off accidentally, saw the meat and ate it.

May 9th: The red box placed to the left. His attention was plainly drawn to the red box and held there. Soon he lifted up the paper and seized the meat in the box.

May 10th: Red box placed to the right. His attention was, as on the day before, distinctly drawn to the red box and on this occasion he walked from the left *over the blue box* and lifted the paper from the red box and at once ate the meat from it.

May 11th: The same experiment as on the day previous and with similar results.

May 14th: Red box placed to the left. He again walked over the blue box, pecked at the red paper covering the other and secured the meat in it.

May 15th: The experiment of May 14th repeated and with the same result.

Owing to accident a couple of later experiments were inconclusive, and to my great regret the bird died on May 19th.

Post Mortem examination showed no special læsion as cause for death, and as his strength had been obviously failing, while his activity remained as great as ever, I am convinced death was due solely to exhaustion. So far, however, as this particular point was concerned, the experiments were sufficient to make the case clear.

It was plain to both the laboratory attendant, who looked after the crow from the first, and to myself, that, from May 9th, at latest, *i.e.*, after five trials, some sort of firm mental association has been formed largely through the colour sense as the chief initiating stimulus. One could not but feel convinced of the great distance intervening psychically between such a bird as a gull and a crow.

I was also impressed as a result of these observations as carried out on the three birds, whose life history in the laboratory has been given in outline, of the danger of drawing conclusions from even an

extended series of experiments if these are to be of the nature of wide generalizations.

The above observations are presented simply for what they may be worth to each reader. I know of none of a similar character on birds of these species. They are in no respect ideal but may prove at least suggestive.

It was difficult for me even within the narrow range of observation afforded by the few experiments made on the crow not to realize how greatly different a so-called association may be in one species of bird, even one individual, as compared with another.

An "association" in the case of a gull and a crow, are, I am convinced very different things. They have elements in common, but what is not common may be the greater part. The crow seemed to show real intelligence; he had learned a good deal by a few experiences, and "association" in the narrower sense does not wholly cover this. One sees who looks without prejudice much that cannot be put into words, but which nevertheless impresses, and must influence his judgment, and it is for this reason that I have always laid so much stress on that general knowledge of animals that must modify all conclusions derived from experiments which in the nature of the case can give but a very limited amount of real knowledge of the psychic processes of any animal.

Let us have all the experiments possible—let us gather facts—let the facts be much more numerous than the theories, and let us be very cautious in drawing conclusions, especially such as seem to be radically destructive in tendency.

I am as thoroughly convinced as ever that the simple explanations some offer are not justified for the higher mammals or even the higher vertebrates.

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Abstracts of Writings on Canadian Geology for 1905.

As requested by Section IV, at the last meeting of the Royal Society of Canada, it was agreed and subsequently endorsed by the whole Society, that abstracts or reviews of papers issued in 1905 and subsequent years be added to the bibliographical reference. With a view of carrying out the object of the Society, and at the same time utilising excellent material at hand, the writer has excerpted from the *Geologisches Centralblatt*, Berlin, Germany, edited by Dr. K. Keilhack, the abstracts and digests made by Dr. G. A. Young, of the Geological Survey of Canada and one review by Dr. R. Ruedemann on “*Cleiocrinus*.” The numbers affixed to the abstracts correspond with numbers placed at the end of the references in Bibliography.

- (1) ADAMS, F. D.—The report is accompanied by a geological map and a brief description of the region. The wells are situated in flat-lying palæozoic strata, largely calciferous. The underground waters follow irregular channels resulting from the solvent action of the waters acting along joints, bedding planes and cracks in the limestone beds.
- (2) BAILEY, L. W.—A review of the known occurrences, within the province, of rocks of volcanic origin. The great periods of volcanic activity were the Huronian, Silurian, Lower Carboniferous and Trias. The “typical volcanic rocks of the Pre-Cambrian (Huronian) system are diorites and diabase; those of the Silurian, felsitic and porphyritic rhyolites; those of the Lower Carboniferous, dolerite, and those of the Trias, basalt.”
- (3) BARLOW, ALFRED ERNEST.—“Report on the Origin, Geological Relations and Composition of the Nickel and Copper Deposits of the Sudbury Mining District, Ontario, Canada.” Illustrated, 5 maps, pp. 232, part II, Annual Report, Vol XIV, Geological Survey of Canada, Ottawa, 1905, (Issued end of December, 1904).

The district is an uneven, rocky plain underlain by rocks mostly of Huronian age. The relative ages of all of the rock bodies are not

known, but they are tentatively grouped in four divisions which, beginning with the lowest, are, Upper Huronian, Laurentian, Upper Huronian (?), and post-Huronian.

At the base of the lower division of the Upper Huronian occurs a series of diorite, porphyrite, hornblende and chlorite schists. The less altered, more massive varieties appear to have been gabbros and may often be traced passing into the perfectly schistose types. The rocks of this series are known as the "greenstone schists," and are believed to have been basic eruptives which were greatly faulted, folded and metamorphosed before the post-Huronian intrusions took place. Involved in the greenstone schists are certain masses which present some of the characteristics of effusive bodies.

Large areas of greywacke or feldspathic sandstone and quartzite with local developments of conglomerate are present and are sometimes intimately associated with the greenstone schists. The greywackes have been formed mainly of volcanic ashes, they gradually pass upwards into the quartzites which are undoubtedly of sedimentary origin. A rock, that in the field and under the microscope closely resembles a granite, occurs over considerable areas. The field relations show that this "regenerated granite" is a highly metamorphosed greywacke or feldspathic sandstone. The relative position of the conglomerate is not definitely known, but it is not improbable that the succession in the lower division of the Upper Huronian may be as follows: First, the greenstone schists overlain by the regenerated granite and above the latter quartzite, then an unconformity, and secondly, the conglomerates followed by beds of greywacke passing up into quartzite.

With the lower division of the Upper Huronian are classed certain masses of gabbro or norite or their altered forms (diorite), which are intrusive into all of the foregoing rocks. These gabbros present certain characteristic features which distinguished them from the post-Huronian intrusives.

The preceding Huronian rocks, with the possible exception of the last mentioned gabbro type, are intruded by masses of foliated and banded granitic and dioritic rocks. These are classed as Laurentian.

Younger than all of the foregoing divisions is a formation, composed of volcanic breccias and agglomerates overlain by bituminous shales that gradually pass upwards into comparatively coarse greywacke or feldspathic sandstone. These rocks, probably of Upper Huronian age, appear to form a synclinal trough underlain by younger norites.

The post-Huronian eruptives include granites, the nickel-bearing eruptive and dykes of olivine diabase, the latter the youngest of all. The granites are mineralogically much alike and occur in batholites. These masses have been formed by intrusions closely following one another and closely followed by the intrusion of norite containing the nickel ore. As a result, in some places the granite mass cooled sufficiently to allow the norite to cool against it while, in other places, the acid magma was still so fluid that the contact between it and the norite is marked by a rock of intermediate characters.

The nickel-bearing eruptive varies from a norite at its borders to a handed biotite granite towards the centre of the mass. The char-

acter of the differentiation is shown by a series of chemical analyses. In the norite, hypersthene and enstatite usually predominate largely over the diallage and the rock contains notable quantities of quartzite sometimes in granophyric intergrowths with the basic plagioclase feldspar. Pyrrhotite, chalcopyrite and pyrite are always present in the rock as original constituents and sometimes, in perfectly fresh specimens, are so abundant that the rock might be classed as a pyrrhotite norite.

The norite forms one large and several smaller masses, the latter probably connected with the main mass at no very considerable depth. The ore occurs at the margin of the norite intrusion in large, irregular, oval-shaped masses. It consists mainly of pyrrhotite with smaller amounts of chalcopyrite, etc. The nickel is present in the mineral pentlandite which is distributed mainly through the pyrrhotite. All the minerals found in the ores are described and their chemical composition discussed. The ores of igneous origin, the result of differentiation, though secondary action has played a considerable role in some instances.

The report includes a review of the previous examinations and descriptions of the district and a history of mining development in the region; discusses the origin and genesis of nickel ores throughout the world; the metallurgical processes and the mode of refining the nickel are described and the uses of nickel detailed.

- (4) BELL, J. M.—The rocks of the district are mapped as Keewatin with the associated iron formation separately coloured, Lower Huronian, post-Huronian granites, etc., and Keweenawan eruptives. The Keewatin schists form several extensive areas within which lie long, broken bands of the iron formation. The Lower Huronian and Keweenawan eruptives form a number of, relatively, much smaller areas lying almost entirely, within or on the borders of the Keewatin areas. The post-Huronian granites and syenites occupy by far the greater part of the district. The Keewatin schists are unconformably overlain by the Lower Huronian, the post-Huronian granites, etc., are younger than and have intrusive contacts with both of the preceding formations while the basic Keweenawan eruptives are the youngest rocks of the district. The Keewatin and Lower Huronian are folded and in one area the Keewatin occurs in a closely folded synclinalorium.

The Keewatin is a complex of schistose rocks originally gabbro, quartzite porphyry, felsite, tuff, etc., with isolated occurrences of phyllite and arkose. These rocks are, in places, further altered to sericite and chlorite schists, and sometimes to biotite and amphibole schists. The iron formation of the Keewatin consists of cherts, jaspers and iron ores interbanded with and grading into one another, quartzites and phyllites also occur within this division. The Lower Huronian consists chiefly of a closely folded and mashed conglomerate. The post-Huronian acid intrusions include granite and syenite with quartzite porphyry facies. Certain areas of banded gneisses within the granites are thought to be much metamorphosed Keewatin quartzite porphyry. The Keweenawan eruptives consist of diabase and gabbro in the form of dykes, sheets and bosses.

- (5) BUCHAN, J. S.—“The purpose of the paper is to give an illustration of what may be seen and observed on even so commonplace an occasion as a railway journey from one place to another.”

- (6) CATHERINIET, JULES.—“Copper Mountain, British Columbia.” Eng. and Mining Journal, Vol. 69, pp. 125-127, 5 figs.; 1905.

Copper Mountain is chiefly a mass of gabbro. The upper portion contains veinlets and veins of bornite and also a pegmatite. The appearance of the veins of bornite and pegmatite suggest a common origin for both. In other places the bornite, accompanied by some chalcopryite, occurs in irregular masses scattered through a coarse pegmatite vein. The bornite is an original constituent of the dykes while the chalcopryite is secondary to the bornite. The pegmatite also carried native gold and sperryllite.

- (7) CHALMERS, ROBERT.—A summary description of the season's work and containing a number of notes on the glacial geology of the region.

- (8) CORKILL, E. G.—The article contains abstracts of the chief theories of the origin of oil and gas. Measured sections are given of the palæozoic strata, from the Cambrian to Devonian, of the oil fields of Western Ontario together with a partial record of boring operations.

- (9) DILLOX-MILLS, S.—“Temiskaming.” Eng. and Mining Journal, Vol. 79, pp. 996-997, 1 map, 2 figs., 1905.

Ores of cobalt, nickel and silver, with native silver, occur in lower Huronian rocks varying from slates to conglomerates. These rocks are often sheared parallel to two planes and have been intruded by diabase and gabbro. The ore deposits have formed along some of the shearing planes and are possibly due to fumarole action accompanying the gabbro intrusion.

- (10) DOWLING, D. B.—“The Stratigraphy of the Cascade Coal Basin.” Can. Min. Rev., Vol. 24, pp. 105-111, 6 figs.; 1905.

The coal-bearing strata of the basin belong to the lower Cretaceous and owe their exposure to the uplift of the Rocky Mountains. The greater part of the basin is bounded by a fault which follows, in a general manner, the crest of the anticline, but northward, the break gradually passes into a fold.

- (11) DRESSER, J. A.—The article is a description of a six mile section across the Sutton Mountain anticline. The rocks of the section at one time classed with the Quebec Group were later, with the exception of a band of Trenton limestones, mapped as pre-Cambrian. The section includes black limestones, black mica schists, gray mica schists micaceous dolomite and quartzite now shown to be all of sedimentary origin, to have been deposited and to pass into one another in the order named. At one locality the micaceous dolomite holds Lower Silurian fossils. At one end of the section are exposures of a basic volcanic, at the other end of serpentine. These igneous rocks are older than the sedimentary series. The sediments, again placed in the Quebec group,

occupy a trough between ridges of two earlier igneous rocks and the latter, alone of the rocks of the district, may possibly be of pre-Cambrian Age.

- (12) ELLS, R. W.—The article outlines the results of various geological investigations at a number of localities within the province.
- (13) EVANS, H. F.—“A reconnaissance into Highland Valley, British Columbia.” *Mining World*, Vol. 22, pp. 526-527, and p. 546; 1905.
- The area known as the interior plateau of British Columbia was, during early Tertiary, denuded to base level, has since passed through a succession of elevations and depressions, has been at times an area of deposition and a theatre of volcanic eruptions.
- (13a) EVANS, H. F.—“In the Eocene Tertiary the interior plateau was reduced by prolonged denudation to the conditions of an approximately uniform plane. Since then, the area has been deformed by earth movements, strata have been deposited and volcanic flows have taken place.
- (14) EVANS, H. F.—The two articles contain a summary description of the occurrence of molybdenum in a system of quartz veins cutting a granite.
- (15) GILPIN, B. J.—The article contains a number of hitherto unpublished, sections and analyses of coals of the province.
- (16) HOTCHKISS, W. O.—The geological formation of the district, in ascending order, are, Keewatin, Laurentian, Lower Huronian, Middle Huronian, large masses of diabase probably of Keweenawan age, and Niagara limestone. The Keewatin greenstone schists are intruded by the Laurentian granite and both are overlain by the Lower Huronian which is composed of conglomerates and shales, usually lying in a nearly horizontal position. The ores occur in narrow, vertical fissures in the Lower Huronian near the contact with the Keewatin and usually also near the diabase. The principal gangue mineral is calcite with accessory quartzite. The most valuable mineral is native silver, the most abundant, smaltite chloanthite while of the many accessory minerals, those mined for values are chiefly niccolite cobaltite. The Keewatin schists are well mineralized with arsenical iron and copper pyrite. The deposits are possibly due to meteoric waters which, warmed by the presence of the slowly cooling masses of diabase, derived the ores, to a large extent, form the Keewatin scists. The cobalt ores and calcite were first deposited and, after a second period of fracturing, the silver was deposited, the cobalt ores acting as a precipitating agent for the silver.
- (17) LOW, A. P.—A summary of the results of the expedition, including notes on the geology of the regions visited.
- (18) MCINNES, WM.—A summary description of the season's work. The region visited is one of low relief and owes its most striking features to deposits of glacial origin. The underlying rocks are all Archean, mainly biotite gneisses with areas of Keewatin schists.

- (19) McMILLAN, JAMES.—“The area is a plain, in all probability once the bed of a glacial dammed lake.” Rock exposures are uncommon. The greater part of the area has been mapped as Huronian, the most common rocks being variously altered basic eruptives. The regions also includes an area of Laurentian and gneisses.

- (20) MERRILL, F. J. H.—A brief notice of the occurrence of narrow calcite veins cutting Grenville limestone and carrying galene.

- (21) MILLER, WILLET G.—“Nepheline syenite in Western Ontario.” *Am. Geol.* Vol. 32, pp. 182-185; 1905.

This article records a probable new occurrence of nepheline syenite in Ontario. The locality is supposed to be near Sturgeon lake, about one hundred and fifty miles northwest of Port Arthur. Boulders have been found and similar rock is supposed to be in situ near at hand. Hastings County, Kippewa lake, and the Rainy River district have hitherto been the only known localities of the occurrence of this rock.

The amphibole of the rock has an extinction, $C: C$, of 20° , which distinguishes it from arfvedsonite.

- (22) MILLER, W. G.—The report is accompanied by a map showing the areal geology of the district surrounding Cobalt. The oldest rocks are Keewatin greenstones and schists, these have been intruded by a granite which is classed as Laurentian. Both the Keewatin and Laurentian are unconformably overlain by the Lower Huronian and the latter is separated by an unconformity from the Middle Huronian. The Lower Huronian rocks are conglomerates, greywacke-slates and quartzites. The middle Huronian consists of conglomerates and quartzites. Large areas of diabase are present in the district which are of post-Middle Huronian age and probably occur both as widespread sills and as boss-like bodies. Towards the north of the district the above rocks are overlain by beds of Silurian limestone.

The veins of ore are mainly confined to an area 5-6 miles long by 2-3 miles broad. The veins are very narrow and with but few exceptions are confined to the Lower Huronian, but have also been found cutting the Keewatin and the post-Middle Huronian diabase. The veins usually consist chiefly of smaltite, niccolite, calcite and native silver deposited in the order named. These minerals are accompanied by native bismuth, argentite, chloathite, dyscrasite, etc. The mineral group as a whole is characterized by the subordinate part which sulphur plays in comparison with arsenic. The report contains descriptions and in a number of cases analyses of the minerals. The fissures are thought to have been formed as a result of the contraction following the cooling of the diabase and the vein material to have been deposited by heated waters which marked the last phase of the volcanic activity accompanying the intrusion of the diabase.

- (23) MILLER, W. G.—The iron formation consists of jaspilite and occurs as a narrow band within Keewatin schists, the latter are cut by Laurentian granite and syenite. A few small outcrops of Lower Huronian conglomerates are present.

- (24) NOLAN, A. W. and DIXON, J. D.—Geology of St. Helen's Island, Can. Rec. Sci., Vol. 9, p. 53-66, 1903.

This paper is a discussion of some of the results of a detailed geological Survey of St. Helen's Island, Montreal, which was made a part of the Honour Course in Geology at McGill University in 1901-1902. It principally describes the late Devonian breccia of the island which is a result of the intrusion of the ancient volcano now represented by the stock of Mount Royal. The breccia has a dolomitic matrix, probably due to composition of a nepheline-bearing ash, and contains fragments of earlier rocks. While it rests on Utica (Cambro-Silurian) shale, some of the included rocks are Oriskany (lower Devonian) in age. This is interpreted to show that the greater part of the Devonian formation had been removed by denudation at the time of the irruption of Mount Royal; a conclusion that is corroborated by the general absence of this formation from western Quebec.

- (25) O'SULLIVAN, OWEN.—A summary description of the season's work. Only two rock exposures were found on the west coast of James Bay, they were of fossiliferous Devonian limestone. Evidence is given to show that the coast is slowly rising.
- (26) POOLE, H. S.—The basal rocks of the Magdalen islands are of Carboniferous limestone age, it is believed that, as shown by soundings, they once extended in a fold parallel to the present coast of Cape Breton and near to Prince Edward Island. A second anticline, the Wallace anticline, commences in carboniferous strata in Nova Scotia and is believed, as shown by soundings, to extend further to the east, underneath the water and parallel with the above submerged ridge. "Within the shelter of these ridges possibly were the condition alone favourable for the accumulation of coal in seams of workable thickness. Prince Edward Island and the major part of the Gulf (of St. Lawrence) lie outside the fold."
- (27) SHERZER, W. H.—The report is a summary of the most important observations made during the season of 1904, by the Smithsonian expedition, upon five glaciers lying within fifty miles of one another. It contains descriptions of the structures, rates of movements and various phenomena connected with these glaciers. A parasitic glacier, on a tributary of the Victoria glacier, moves across the tributary and delivers its ground moraine to the medial moraine of the main stream. The Wenkchemma glacier is of the piedmont type and is composed of eight to ten ice streams. Observations show that the ice granules of the glaciers tend to lie with their principal optic axes vertical. Three types of dust bands are described. The first type is the original dust bands of Forbes and their formation is explained. The second type is named dust zones and is caused by the relatively larger proportion of foreign material in one of two outcropping ice strata. The third type is named dirt strips, it is entirely superficial and is due to the collection of dirt in the vesicular ice separating laminae on a surface subject to melting. A double series of block moraines, comparatively free from finer material, occurs in connection with four of the five glaciers examined, its absence from the fifth is probably due to the form of the surrounding moun-

tains. It is argued that, since normal conditions could not form this type of moraine, therefore they must have been caused by a double seismic disturbance of the entire region. The time of the occurrence of the probable earthquake is assigned to the thirteenth century.

- (28) SPRINGER, FRANK.—“*Cleioocrinus*.” Harvard Coll., Mus. Comp. Zool. Mem., Vol. 25, No. 2, pp. 93-114, 1 pl., 1905.

The genus *Cleioocrinus* has been a puzzle since it was established by Billings to receive certain very peculiar Crinoids from the Trenton group of Canada. Its principal peculiarity consists in the composition of the lowest visible ring of ten plates. Wachsmuth and Springer have twice discussed the genus in the Revision of the Palæocrinoidea and, from its resemblance to *Ichthyocrinus*, assumed the presence of five concealed basals and three infrabasals.

An investigation of the specimens in the Museum of the Survey at Ottawa has, after preparation of the base of one of Billings's types, disclosed a most extraordinary and anomalous structure.

Instead of two concealed rings, there is only one, consisting of five large, thick quadrangular plates, resting on the column and sloping from within upward to a thin upper face. These are radially situate and followed by the first and second primibrachs, not alternating with them, but in direct succession. The ten plates of the lowest ring observed before do not enter into the interior of the calyx wall proper, but are suspended on the outside of it, to which they are firmly grown. The author holds now that the so-called interradians of the outer ring are the basals,” which by some strange freak of nature have morphologically—not accidentally—become displaced from their proper position in the calyx wall, being pushed in between the radials, and both having slipped down over the infrabasals. Or “or,” it is added, “supposing a reverse process to have taken place, we may consider, that the disturbance came from below, the base being thrust upward into the calyx.”

In regard to the systematic relations of *Cleioocrinus* it is stated that the general habitus of the genus is that of *Ichthyocrinus*, and that its articulate structure and flexible calyx point strongly toward the *Flexibilia*, while, on the other hand, the presence of pinnules and of five infrabasals instead of three, differentiate it absolutely from the known *Flexibilia Impinnata* to which all paleozoic forms of the group hitherto known belong. It is, therefore, suggested that *Cleioocrinus* like *Rateocrinus*, it is an intermediate group between the *Flexibilia* and *Camerata*, closely approximating the *Flexibilia*. Definitions of the genus and its two species close the interesting account.

- (28) SMITH, W. N.—The formations present include the Lower Huronian, Upper Huronian (Animikie), and Keweenawan. West of the district the Lower Huronian unconformably overlies the Keewatin schists. The Lower Huronian is composed largely of schistose greywacke intruded by masses of greenstone, both of these, in turn, are intruded by bodies of granite. This granite is older than the Animikie which, as compared with the Lower Huronian is almost flat-lying and rests unconformably on the latter formation. The Animikie consists of slate

with two iron horizons. The Upper iron horizon is largely a cherty iron carbonate, the lower band is distinguished by the presence of granules. The Keeweenawan lies unconformably on both the Animikie and the Lower Huronian. The formation consists of conglomerates, sandstones and marls. The Animikie and Keweenawan are intruded by sills of diabase (R. Ruedemann).

- (29) WELLS, J. WALTER.—The occurrences of limestones within the province and a large number of analyses of these rocks are given.
- (30) WELLS, J. WALTER.—The report contains an account of the distribution and character of the clays and shales and a number of chemical analyses of them.
- (31) WILSON, A. W. G.—The section occurs along the north shore of the lake, the last eight miles are mapped and described in detail. Wherever the deposits are seen resting on bed-rock, the lowest portion consists of a clay till carrying boulders and pebbles. In places the lower till is overlain by stratified sands and these, in turn are sometimes followed by a sheet of till, in part stratified. The upper sheet sometimes rests unconformably on the lower. In the portion of the section described in detail, the lower sheet of till, except at one end of the section, is succeeded by the stratified sands, the whole capped by the upper till sheet. Within the sands, between the upper and lower till sheets, occurs a non-continuous till sheet, dividing the deposits into two sets, belonging to two interglacial epochs. After the deposition of the sands of the second interglacial epoch, there followed a period of unequal erosion during which the continuity of the middle till sheet was destroyed and, in places, the erosion was deep enough to allow the last till sheet to be deposited immediately on the lowest. The greatest measured thickness of the deposit is about 130 feet.
- (32) WOODMAN, J. E.—The author contrasts the bedded gold-bearing quartz veins of the eastern portion of the gold-bearing series of Nova Scotia with the saddles of Bendigo. In the former case the veins occur in zones which are situated within domes, usually those having a high angle of pitch, and these domes are irregularly distributed along a series of east and west anticlines. The domes occur in discontinuous slate horizons lying in a quartzite formation. The zones of veins are confined to the slate measures and, therefore, have a limited lateral extent, the veins are continuous in certain cases to considerable depths depending on the amount of erosion the dome has suffered.
- (33) YOUNG, G. A.—A summary report on the season's work. The district contains large areas of Keewatin schists penetrated by granite, the latter cut by a body of syenite. The schists and granite are overlain by a conglomerate and slates of Huronian age and these are capped by sills of diabase.







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